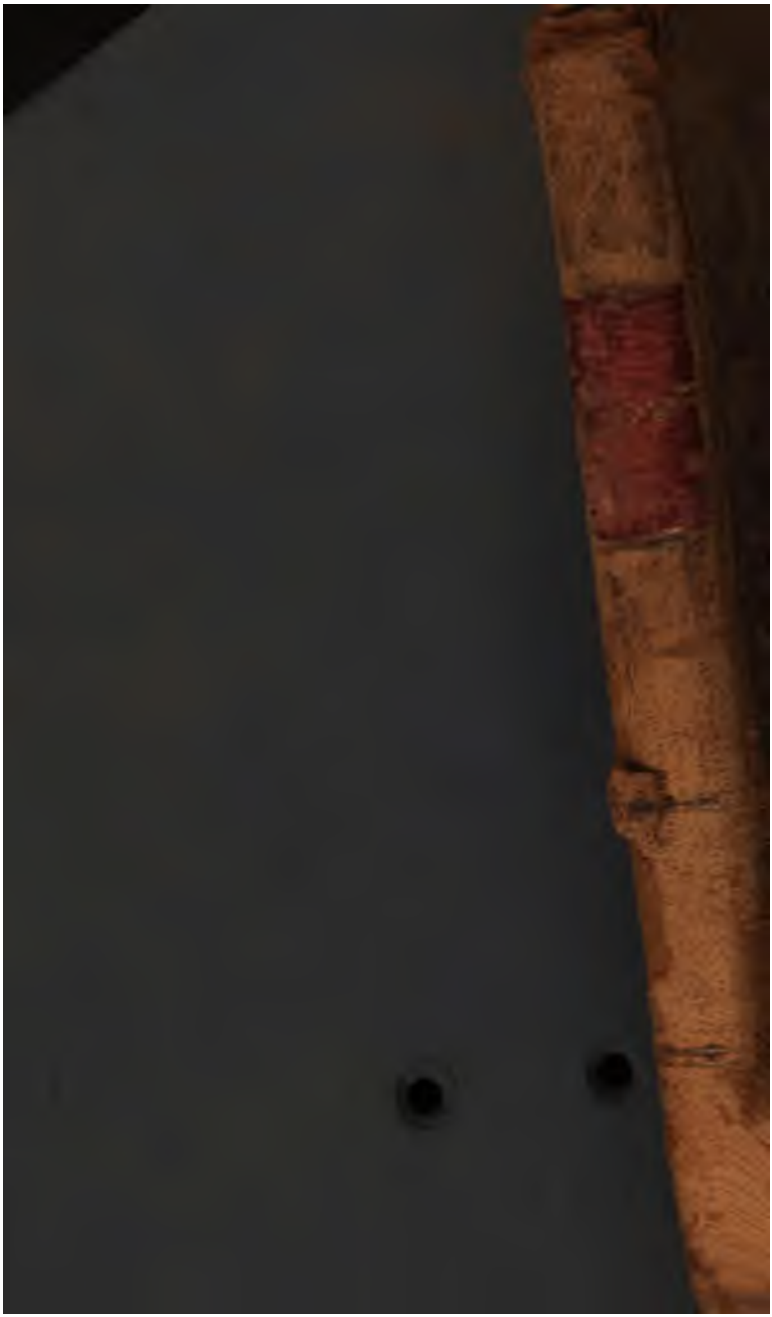

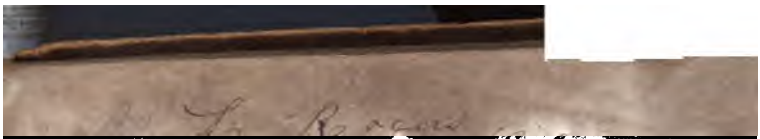

Wm. L. Rogers Salem Jan

William L. Rogers Salem

Jan 7. 1

A

KEY,

CONTAINING

ANSWERS TO THE EXAMPLES

IN THE

SEQUEL TO

INTELLECTUAL ARITHMETIC.

BY WARREN COLBURN, A. M.

STEREOTYPED AT THE BOSTON TYPE AND STEREOTYPE FOUNDRY.

BOSTON:

HILLIARD, GRAY, LITTLE, AND WILKINS.

1827.

DISTRICT OF MASSACHUSETTS, TO WIT:

District Clerk's Office.

BE IT REMEMBERED, That on the eleventh day of May, A. D. 1827, in the fifty-first year of the Independence of the United States of America, HILLIARD, GRAY, LITTLE, AND WILKINS, of the said district, have deposited in this office the title of a book, the right whereof they claim as proprietors, in the words following, *to wit:*

"A Key, containing Answers to the Examples in the Sequel to Intellectual Arithmetic. By WARREN COLBURN, A. M."

In conformity to the act of the Congress of the United States, entitled, "An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned:" and also to an act, entitled, "An Act supplementary to an act, entitled, An Act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned; and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

JNO. W. DAVIS,
Clerk of the District of Massachusetts.

ADVERTISEMENT.

THE Key contains the answers to all the examples in the Sequel; and occasional remarks, showing how to solve the questions, and how to use the book. Of course it is intended only for the use of instructers, and of those who wish to teach themselves. Great care will be taken to prevent improper persons from obtaining it. Those who wish for it must make personal application to the publisher.

KEY.

I.

Answers to the Examples in Art. 1.

1. Twenty seven.
2. Thirty five.
3. Fifty eight.
4. Sixty three.
5. Seventy.
6. Eighty four.
7. Ninety six.
8. One hundred.
9. One hundred and three.
10. One hundred and ten.
11. One hundred and thirteen.
12. One hundred and twenty seven.
13. Three hundred and eight.
14. Five hundred and twenty.
15. Seven hundred and thirty eight.
16. One thousand.
17. One thousand, and one.
18. One thousand, and ten.
19. One thousand, one hundred.
20. One thousand, and eighteen.
21. Two thousand, one hundred and seven.
22. Three thousand, two hundred and fifty.
23. Five thousand, seven hundred and ninety six.
24. Ten thousand.
25. Twenty thousand, and thirty.

26. Fifty thousand, seven hundred and five.
27. Sixty seven thousand, and eighty three.
28. Three hundred thousand, and fifty.
29. Four hundred and seventy six thousand, and eighty nine.
30. Seven hundred and seven thousand, seven hundred and twenty.
31. One million, three hundred and seventy.
32. Five millions, six hundred thousand, and seventy three.
33. Eight millions, eighty one thousand, three hundred and five.
34. Fifty nine millions, six thousand, three hundred and forty one.
35. Three hundred and five millions, eight hundred and seventy thousand, four hundred.
36. Five hundred and ninety millions, forty seven thousand, six hundred and eight.
37. One billion.
38. Three billions, six hundred and seventy millions, three hundred and eighty seven.
39. Forty five billions, seven millions, seventy thousand and seven.
40. Six hundred and eighty billions, nine hundred and thirty millions, one hundred thousand, seven hundred.
41. Fifty trillions, seven hundred and eighty seven billions, six hundred and fifty seven millions, five hundred.
42. Two hundred and seventy trillions, eight hundred and thirty eight millions, three thousand, nine hundred and eight.
43. Sixty eight millions, nine [illegible]ed and seven thousand, six hundred and five.
44. Fifty six billion[illegible] and fifty.
45. Six trillions, sev[illegible] dred and tw[illegible]

Answers to the numbers, to be written in figures.

1.	- -	34	19.	- -	500,071
2.	- -	57	20.	- -	207,609
3.	- -	63	21	-	4,060,084
4.	- -	80	22.	-	97,035,805
5.	- -	100	23.	-	50,070,008
6.	- -	101	24.	-	300,000,057
7.	- -	110	25.	-	2,053,305,200
8.	- -	311	26.	-	50,207,067,200
9.	- -	517	27.	-	87,000,063
10.	- .	850	28.	-	600,000,207,003
11.	- -	986	29.		35,000,009,000,058
12.	- -	1,001	30.		657,007,000,097,067
13.	- -	1,010	31.	-	70,250,367
14.	- -	3,101	32.		407,000,000,087,000
15.	- -	5,060	33.	-	35,000,698,100
16.	- -	10,005	34.	-	40,200,074
17.	- -	30,504	35.	-	83,763,957
18.	- -	67,040			

II.

Addition.

1	-	79 dollars	12.	228 yards.	1,432 dollars
2	-	85 trees	13	- -	814 guns
3.	- -	209 dollars	14.	- -	2,356 men
4.	- -	109	15.	- -	537 pounds
5.	- -	3		- -	8 dollars
6.	- -	1		- -	25 dollars
	-			- -	157 dollars
				-	66 years
				-	66 years
				-	531 dollars
				-	3,487 dollars

23.	2,716 years	29.	3,879,379 inhabitants
24.	A. D. 1783	30.	906,617 do.
25.	A. D. 1799	31.	9,625,734 do.
26.	2,358 years	32.	922,837
27.	1,659,854 inhabitants	33.	9,726,064
28.	3,179,884 do.	34.	99,043,624

III.

Multiplication.

1.	54 dolls.	20.	696 gills
2.	78 dolls.	21.	252 quarts
3.	56 cents	22.	1,008 quarts
4.	85 cents	23.	504 pints
5.	95 dolls.	24.	1,008 pints
6.	141 dolls.	25.	2,016 gills
7.	120 dolls.	26.	8,064 gills
8.	104 dolls.	27.	34 quarts
9.	686 dolls.	28.	39 pints
10.	7,146 dolls.	29.	231 gals.
11.	513 trees	30.	756 quarts
12.	304 yds. / 2,128 dolls.	31.	791 pints
		32.	6,927 gills
13.	2,713 dolls.	33.	403 dolls. 20 cents
14.	126 dolls.	34.	16 dolls. 50 cents
15.	756 dolls.	35.	2,352
16.	16 cents	36.	6,640
17.	1 quart 40 cents / 1 gal. 1 dol. 60 cents	37.	786,924
		38.	19,896
18.	20 dolls. 16 cents	39.	5,743,066
19.	174 pints	40.	65,260,340

IV.

1.	- -	1,026 dolls.	27.	- -	9,525
2.	- -	1,218 dolls.	28.	- - -	33,318
3.	- -	1,344 dolls.	29.	- - -	84,056
4.	- -	1,455 dolls.	30.	- -	140,192
5.	each	126 dolls.	31.	- -	418,670
	whole	2,520 dolls.	32.	- -	769,608
6.	- -	2,100 dolls.	33.	- -	34,650
7.	- -	416 dolls.	34.	- -	7,380
8.	1 year	1,664 dolls.	35.	- -	55,824
	2 years	3,328 dolls.	36.	- -	483,924
9.	- -	168 hours	37.	- -	2,163,942
10.	-	1,440 minutes	38.	- -	196,112
11.	-	10,080 minutes	39.	- -	- 8,001
12.	- -	1,416 hours	40.	- -	- 22,176
13.	- -	504 miles	41.	- -	116,397
14.	- -	264 miles	42.	- -	442 dolls.
15.	- -	3,456 miles	43.	- -	1,479 dolls.
16.	-	2,368 gallons	44.	-	20 dolls. 1 cent
17.	- -	1,656 dolls.	45.	-	3 dolls. 64 cents
18.	-	525,960 minutes	46.	-	22 dolls. 42 cents
19.	- -	832 days	47.	-	23 dolls. 31 cents
20.	in 24 h'rs	12,960 miles	48.	- - -	323
	in 15 days	194,400 m.	49.	- - -	703
21.	- - -	1,218	50.	- - -	2,438
22.	- - -	4,815	51.	- - -	4,794
23.	- - -	7,408	52.	- - -	7,828
24.	- - -	4,950	53.	- - -	14,758
25.	- - -	3,024	54.	- - -	11,774
26.	- - -	50,568	55.	- - -	47,905

V.

1.	- - -	50 cents	3.	-	50 dolls. 40 cents
2.	- -	120 dolls.	4.	- - -	70 days.

5.	87 dolls. 30 cents	23.	50
6.	800 dolls.	24.	470
7.	2,700 dolls.	25.	300
8.	30 cents	26.	1,240
9.	50 dimes. 500 cents	27.	3,870
10.	1,700 cents	28.	4,500
11.	830 mills	29.	130,080
12.	75,300 cents	30.	700
13.	1,000 mills	31.	3,800
14.	84,000 mills	32.	9,000
15.	753 cents	33.	4,000
16.	18,314 cents	34.	73,000
17.	283,438 mills	35.	80,000
18.	8,246,256 mills	36.	132,000
19.	$45.30	37.	800,000
20.	$2.70	38.	1,643,000
21.	$845	39.	7,250,000
22.	$350	40.	764,380,000

VI.

1.	$15.00	12.	$105.00
2.	$202.50	13.	in 7 miles 2,240 rods in 10 miles 3,200 " in 30 miles 9,600 " in 500 m. 160,000 "
3.	$54,000		
4.	1,290 days		
5.	5,810 men		
6.	in an hour 3,600 times in a day 86,400 " in a week 604,800 "	14.	680
		15.	17,100
		16.	15,000
7.	623 seconds	17.	1,935,000
8.	443 minutes	18.	320,560
9.	4,783 minutes	19.	8,120,000
10.	718,459 seconds	20.	198,400,000
11.	$384,000	21.	107,200,000

VII.

1.	\$714	16.	\$2561.625
2.	\$218.62	17.	\$107.125
3.	\$24.32	18.	\$5075.00
4.	\$636.48	19.	\$22,503.78
5.	\$478.50	20.	\$61,362.875
6.	\$565.50	21.	\$434,112.00
7.	\$139.20	22.	41,689
8.	in 1 day 80 miles; in 15 days 1,200 "	23.	1,575,000
		24.	309,848
9.	\$932.75	25.	15,105,150
10.	\$2702.90	26.	103,804,200
11.	\$3053.74	27.	18,720,000,000
12.	\$1819.65	28.	216,004,605,056
13.	in 1 day 192 miles; in 127 d. 24,384 "	29.	362,600,000,000
		30.	23,552,810,540,300
14.	\$1,238,550	31.	30,271,411,995,340
15.	\$679,620		

Miscellaneous Examples.

1.	\$31.36	14.	\$13.296
2.	\$3.36	15.	66,705 grains
3.	\$28	16.	55,799 grains
4.	112 lb.	17.	\$25.37
5.	10 qrs.	18.	\$5.37
6.	102 lb.	19.	\$10.53
7.	252 lb.	20.	\$537.50
8.	219 lb.	21.	\$70.56
9.	288 oz.	22.	126,230,400 sec.
10.	21,504 oz.	23.	261,171,837 sec.
11.	26,680 oz.	24.	42 months
12.	\$36.72	25.	1713 days
13.	\$34.12	26.	165.936 min.

27. - - - ———
28. 57,497,947,200 sec.
29. - - $262.68
30. - - $1972.32
31. - 30,363,840 miles
32. - - 2268 men
33. - - 705 days
34. - - 7905 men
35. - - 522 hours
36. - - 2821 days
37. 1848 days / 3318 men
38. - - 108 yards
39. - - - $269
40. - 520 penny loaves
41. - - $731.74
42. - - - $51.43
43. - - - $0.78
44. - - - $2.58
45. - - - $7.85
46. for 2 years $0.12 / for 5 years $0.30
47. - - - $51.87
48. - - - $3000
49. - - $177.50
50. - - $324.50
51. on $5 $3.40 / on $20 $13.60
52. on $47, $34.31 / on $123, $89.79 / on $2500, $1825
53. gained $36.45 / sold them for $279.45
54. - - $1036.89

VIII.

Subtraction.

1. - - 5 peaches
2. - - - $6
3. - - 18 apples
4. - - - $19
5. - - - $29
6. - - - $48
7. - - 27 years
8. - - 37 years
9. - - 64 years
10. - - 48 yards
11. - - - $23
12. - - - $115
13. - - - $92
14. - - - $666
15. - - $1236
16. - - 13 miles
17. - - 180 miles
18. - - 67 years
19. - - A. D. 1706
20. horses $466 / horses more than carriage $79
21 - - $3823
22. - - $11,608
23. - 80,428 inhabitants
24. - increase 10,028

25. - - $114
26. - - $4562
27. - - - $0.925
28. A received $4150.88
29. - - $220.50
30. { he lost $151.20 / he sold it for $1738.80
31. { he spends $1193.55 / he saves $642.45
32. - - 462,365
33. - - 292,999
34. - - 36,996,322
35. - - - 8,844
36. - - - 1,956
37. - - - 1,973
38. - - 51,494
39. - - 159,927
40. - - - $999
41. - - $999.83
42. - - 800,047
43. - - 159,930
44. - - - 9,877
45. - - $840.86
46 - - 80,547
47 - - $14,146.58
48. - - $1117.53
49. - - $999.99

IX.

Division.

1. - - 6 oranges
2. - - 9 barrels
3. - - 14 bushels
4. - - 14 barrels
5. - - - $16
6. - - 21 pence
7. - - - 13 lb.
8. - - - 14 lb.
9. - - - 17 lb.
10. - - - 20 cwt.
11. - - - 23 cwt.
12. - - . 19 cwt.
13. - - - 7 lb.
14. - - - 8 yds.
15. - - - 4 oz.
16. - - 7 bushels
17. - - - 11 yds.
18. - - - 33 lb.
19. - - - 61 qts.
20. - - £1 18s.
21. - - £2 13s.
22. - - £4 7s.
23. - - £5 15s.
24. - - £8 18s.
25. - - £12 13s.
26. - - £312 7s.
27. - - 3s. 2d.
28. - - 12s. 9d.
29. - - 123s. 10d.
30. - - 2236s. 10d.
31. - - 22d. 1qr.
32. - - 60d. 3qr.

33. - - 941d.
34. - 2s. 10d. 1qr.
35. - 7s. 11d. 2qr.
36. - £1 10s. 10d.
37. - £3 10s. 6d.
38. - £16 1s. 6d.
39. - £2 8s. 9d.
40. - £90 17s. 9d. 1qr.
41. - 10 gals. 3 qts. 1 pt.
42. - 28 gals. 3 qts.
43. - 12 qts. 2 gls.
44. 5 gals. 2 qts. 1 pt. 3 gls.
45. 131 gals. 3 qts. 1 gill
46. 7[illegible]5 gals. 3 qts.
47. - 2 hhds. 22 gals.
48. 15 T. 1 hhd. 30 gals.
49. - 6 T. 12 gals. 2 qts.
50. - 14 min. 33 sec.
51. - 3 days 15 hours
52. - 2mo. 2 w. 3 d.
53. - 1 d. 21 h. 38 min.
54. - - 10 mo. 1 w.
55. - - 16 y. 24 d.
56. - 1 lb. 1 oz. 1 dr.
57. . 19 lb. 13 oz. 7 dr.
58. - - - 1 ton
59. 156 T. 1 cwt. 0 qr. 2 lb. 6 oz.
60. 16 dwt.
61. 16 oz. 5 dwt.
62. 35 lb. 11 oz.
63. 34 lb. 5 oz. 19 dwt. 10 gr.
64. 117 lb. 9 oz. 7 dwt. 10 gr.
65. 2 yds. 1 qr. 1 nl.
66. 4 E. Eng. 1 qr. 3 nls.
67. 15 yds. 0 qr. 3 nls.
68. 124 E. Flem.
69. 258 E. Flem. 2 qr. 3 nls.
70. 15 guineas 12s.
71. 11 six-pences and 2d. over
72. 16 eight-pences and 2d. over
73. 85 four-pences and 2d. over
74. 231 nine-pences and 7d. over
75. 1938d.
76. 329 three-pences.
77. £121 0s. 9½d.
78. 42 guineas, and 24s. 1d. over
79. 240 three-pences

80. 243 dolls. and 2s. over
81. 80 guineas
82. 124 dollars
83. 72d.
84. 5 dolls. and 1s. 10d. over
85. 108 dolls. and 4d. over
86. 17 E. Flem. 1 qr.
87. 2 E. Eng. 1 qr.
88. 10 aunes 1 qr.
89. 91 yds. 1 qr.
90. In a little more than 26 days
91. £9 2s. 6d.
92. 50 spoons and 8 dwt. over
93. 3lb. 3 oz.
94. 27 coats
95. 168 bottles
96. 144 of each kind
97. 7 of each sort
98. 15 of each sort
99. 23 bushels of each sort.
100. - 36 of each sort
101. - - 2840 boxes
102. - - 329 qqls.
103. - - 24 barrels
104. - - 30 bushels
105. - - 348 lb.
106. - - 7yds.
107. - - 856 times
108. - - 4291 times
109. - - 9604 times
110. - - 290 times
111. - - 3669 times
112. - 16,212 times
113. - 11,807 times
114. - - 5337 times
The dividend in this example should have been 80,055
115. - - 731 times
116. - - 52 times
117. - - 37 times
118. - - 33 times
119. - - 94 times
120. - - 38 times
121. - - 75 times
122. - - 29 times
123. - 36[illegible] times
124. - - 826 times

125. - - 9405 times
126. - - 7638 times
127. - 134,092 times
128. - 1,003,245 times

Miscellaneous Examples.

1. - - 12s. 9d.
2. - - - 9s.
3. - - 10s. 6d.
4. - - £1 4s. 9d.
5. - - £2 13s.
6. - - £7 6s. 8d.
7. - - £20 10s.
8. - - - £21
9. - 1 qr. 15 lb. 5. oz.
10. - - £24 3s.
11. - - £10 8s. 4d.
12. 7 cwt. 3 qrs. 11 lb.
13. 14 cwt. 3 qrs. 13 lb.
14. 19 cwt. 3 qrs. 8 lb.
15. 58 cwt. 1 qr. 20 lb.
16. - - £6 12s.
17. - £28 0s. 0d.
18. - - £7 16s. 4d.
19. - - £2 13s. 4d.
20. - - £4 17s. 9d.
21. - - £11 7s. 6d.
22. - - £36 16s. 8d.
23. - per lb. £4 1s.
for the whole £10 9s. 3d.
24. - - £88 0s. 8d.
25. - - 12s. 9d.
26. - - 2 lb. 9 oz.
27. - - 1 T. 18 cwt.
28. - - £13 11s. 4d.
29. - 51 gals. 1 qt. 1 pt.
30. - 83 yds. 3 qrs. 1 nl.
31. 47 bu. 3 pks. 4 qts.
32. - - £7 17s. 8d.
33. 17 cwt. 3 qrs. 25 lb.
34. - 15 yds. 2 qrs.
35. - - 45 gals. 1 qt.
36. - - - 2s. 3d.
37. - - - £9 1s.
38. - - 7 yds. 3 qrs.
39. - - 14 yds. 2 qrs.
40. - - 8 lb. 13 oz.
41. - . 11s. 9d. 2qr.
42. - - £1 3s. 4d.
43. - 9 cwt. 1 qr. 15 lb.
44. - 43 cwt. 1 qr. 24 lb.
45. - 3 cwt. 2 qrs. 12 lb.
46. 23 yds. 1 qr. 2 nls.
47. - 7 yrs. 9 mo. 1 d.
48. - 8th March 1815
49. 4th June, 0 h. 36 min. 34 sec.

X.

1. $1
2. $1
3. $125 will buy 62½ lb.
4. ⅓ bu. will cost 1s. ⅔ bu. will cost 2s.
5. $28 will buy 9⅓ bbls.
6. 41⅔ boxes
7. 226⅔ bottles
8. $1, $2, $3
9. ¼ &c., 4¾ boxes
10. 81¾ barrels
11. $1, $2, &c.
12. ⅕ &c., 7⅘ weeks
13. 90⅜ bbls.
14. $1, $2, $5, $7, $11
15. for $56, 9⅛ reams
16. 72⅛ bbls.
17. from Boston to New-York in 35⅝ hours
18. 9⅜ chaldrons
19. 50⅓ reams
20. 347⅖ bbls.
21. 425⅔ bbls.
22. 106⅛ cords
23. 5$\frac{5}{17}$ lb. 11$\frac{13}{17}$ lb. 52$\frac{3}{17}$ lb.
24. $\frac{1}{25}$ cwt. $\frac{3}{25}$ cwt. $\frac{8}{25}$ cwt. $\frac{18}{25}$ cwt. 95$\frac{12}{25}$ cwt.
25. 15$\frac{7}{25}$ tons
26. $\frac{1}{32}$, $\frac{2}{32}$, $\frac{7}{32}$, $\frac{15}{32}$, $\frac{27}{32}$, 2$\frac{23}{32}$, 26$\frac{21}{32}$
27. 38$\frac{43}{45}$ gals. for $17.53
28. $\frac{1}{138}$ T. $\frac{17}{138}$ T. $\frac{35}{138}$ T. $\frac{87}{138}$ T. $\frac{115}{138}$ T. 6$\frac{47}{138}$ T. 199$\frac{22}{138}$ T.
29. $\frac{1}{675}$ &c., 10$\frac{575}{675}$ bbls.
30. - - 47$\frac{29}{73}$ galls.
31. - - 34$\frac{17}{275}$ cwt.
32. - - 22$\frac{96}{135}$ days
33. - - 199$\frac{36}{125}$ days
34. - - - 66½ lb.
35. - - 32½ bushels

36. - - $48\frac{21}{23}$ lb.
37. - - $15\frac{1}{3}$ bushels
38. - - $37\frac{5}{8}$ gals.
39. - - $6\frac{45}{63}$ hours
40. $\frac{1}{51}$ bu. $\frac{8}{51}$ bu. $\frac{12}{51}$ bu. $13\frac{13}{51}$ bu.
41. - - $41\frac{24}{100}$ gals.
42. - - $74\frac{108}{138}$ gals.
43. - - $22\frac{602}{750}$ bbls.
44. - - - $196\frac{1}{4}$
45. - - - $359\frac{1}{8}$
46. - - - $940\frac{7}{9}$
47. - - - $204\frac{8}{14}$
48. - - $1559\frac{5}{26}$
49. - - - $354\frac{35}{75}$
50. - - $5782\frac{27}{183}$
51. - - - $415\frac{346}{437}$
52. - - $399\frac{274}{2467}$
53. - - $123\frac{6097}{13841}$
54. $1011\frac{209139}{403006}$
55. - - $8014\frac{1308}{12473}$

XI.

1. - - $8\frac{7}{10}$ lb.
2. - - $35\frac{4}{10}$ lb.
3. - - - 16 lb.
4. - - $24\frac{3}{10}$ boxes
5. - - $74\frac{9}{10}$ chald.
6. - - $43\frac{73}{100}$ bu.
7. - $324\frac{87}{100}$ boxes
8. - - $243\frac{84}{100}$ lb.
9. - - $24\frac{763}{1000}$ bbls.
10. - - $87\frac{34887}{10000}$ tons
11. - - - $7\frac{8}{10}$
12. - - - $387\frac{6}{10}$
13. - - - $4\frac{73}{100}$
14. - - - $67\frac{83}{100}$
15. - - $487\frac{68}{100}$
16. - - $4753\frac{84}{100}$
17. - - $5710\frac{648}{1000}$
18. - $176487\frac{4}{10}$ cts.
$17648\frac{74}{100}$ d.
$1764\frac{874}{1000}$
19. - - $4710\frac{74}{1000}$

XII.

1. - - - - $\frac{3}{5}$
2. - - - - $\frac{4}{7}$
3. - - - - $\frac{10}{7}$
4 - - - - $\frac{5}{8}$

5. - - - - $\frac{7}{4}$
6. - - - - $\frac{10}{7}$
7. - - - $\frac{9}{17}$
8. - - - $\frac{17}{9}$
9. - - - $\frac{17}{35}$
10. - - - $\frac{35}{17}$
11. - - - $\frac{4}{67}$
12. - - - $\frac{67}{4}$
13. - - - $\frac{17}{1003}$
14. - - - $\frac{1003}{17}$
15. - - - $\frac{39}{2356}$
16. - - - $\frac{2356}{39}$
17. - - - $\frac{1387}{}$
18. - - - $\frac{8473}{3864}$
19. - - - $\frac{39064}{901384}$
20. - - - $\frac{96483}{3884}$
21. - - $\frac{1}{4}$d. $\frac{2}{4}$d. $\frac{3}{4}$d.
22. $\frac{1}{12}$s. $\frac{2}{12}$s. $\frac{3}{12}$s. &c. $\frac{11}{12}$s.
23. $\frac{1}{48}$s. $\frac{2}{48}$s. $\frac{3}{48}$s. &c. $\frac{35}{48}$
24. - $\frac{7}{48}$s. $\frac{9}{48}$s. $\frac{38}{48}$s.
25. $\frac{1}{20}$£, $\frac{2}{20}$£, &c. $\frac{17}{20}$
26. $\frac{1}{3240}$£, $\frac{3}{3240}$£, &c. $\frac{1347}{3240}$£
27. - - - $\frac{29}{3240}$£
28. - - - $\frac{88}{3240}$£
29. - - - $\frac{1844}{3240}$£
30. - - - $\frac{2227}{3240}$£
31. - - 960 qrs.
32. $\frac{1}{960}$£, $\frac{3}{960}$£, &c. $\frac{4871}{960}$£
33. - - - $\frac{31}{960}$£
34. - - - $\frac{466}{960}$£
35. - - - $\frac{3211}{960}$£
36. - - - $\frac{6583}{960}$£
37. - - - $\frac{1}{4}$ gal.
38. - - - $\frac{1}{8}$ gal.
39. - - - $\frac{1}{32}$ gal.
40. - - - $\frac{7}{32}$ gal.
41. - - - $\frac{23}{32}$ gal.
42. - $\frac{1}{63}$ hhd. $\frac{17}{63}$ do.
43. $\frac{1}{2016}$ hhd. $\frac{4316}{2016}$ do.
44. - - $\frac{5714}{2016}$ hhd.
45. - $\frac{1}{28}$ qr. $\frac{13}{28}$ qrs.
46. - - $\frac{1}{16}$ lb. $\frac{11}{16}$ lb.
47. - $\frac{1}{256}$ lb. $\frac{15}{256}$ lb.
48. - - - $\frac{219}{256}$ lb.
49. - $\frac{1}{7168}$ qr. $\frac{4316}{7168}$ qr.
50. - - $\frac{4536}{7168}$ qr.
51 $\frac{1}{12}$ yr. $\frac{7}{12}$ yr. $\frac{11}{12}$ yr.
52. $\frac{1}{30}$ mo. $\frac{2}{30}$ mo. $\frac{17}{30}$ mo.
53. - - $\frac{1}{60}$ h. $\frac{17}{60}$ h.
54. $\frac{1}{1440}$ day, $\frac{13}{1440}$ day
55. - - $\frac{463}{1440}$ day
56. - $\frac{1}{86400}$ day, &c.
$\frac{2548}{86400}$ day
57. - - $\frac{432437}{86400}$ day
58. $\frac{1}{31557600}$ yr.
$\frac{87734}{31557600}$ yr.
59. - - $\frac{10689210056}{31557600}$
60. - - $\frac{1}{99}$, $\frac{8}{99}$, $\frac{40}{99}$
61. - - - $\frac{63}{201}$
62. - - $\frac{43}{100}$ dol.
63. - - $\frac{72}{500}$ dol.
64. - - $\frac{1}{60}$£ $\frac{17}{60}$£
65. - $\frac{1}{1200}$, $\frac{11}{1200}$, $\frac{56}{1200}$
66. - - - $\frac{1682}{1052}$
67. - - - $\frac{8105}{32121}$
68. - - - $\frac{1}{12}$
69. - - - $\frac{31}{65}$
70. - - - $\frac{79}{3221}$

71. - - - $\frac{30}{11}$
72. - - - $\frac{5}{4320}$
73. - - - $\frac{316}{435}$
74. - - - $\frac{376887}{79998}$
75. - - - $\frac{2220}{351}$
76. - - - $\frac{359}{69}$
77. - - - $\frac{2156}{2699}$
78. - - - $\frac{5}{5}$
79. - - - $\frac{8}{5}$
80. - - - $\frac{9}{26}$
81. - - - $\frac{28}{6}$
82. - - - $\frac{96}{117}$
83. - - - $\frac{294}{57}$
84. - - - $\frac{9433}{38773}$

In taking the ratio of one number to another, some make the first mentioned number the numerator. I have preferred the method given, because it is the one used by Lacroix. It is not important which is used, provided it be understood.

XIII.

1. It will take $\frac{4}{3} = 1\frac{1}{3}$ bbls. to last 4 weeks, and $\frac{17}{3} = 5\frac{2}{3}$ bbls. to last 17 weeks
2. It will take $\frac{11}{7} = 1\frac{4}{7}$ bbl. to last 11 weeks, and $\frac{28}{7}$ = 4 bbls. to last 28 weeks
3. - $\frac{11}{7} = 1\frac{4}{7}$; $\frac{28}{7} = 4$
4. $\frac{57}{13} = 4\frac{5}{13}$ chaldrons
5. - - - $4\frac{5}{13}$
6. - - - $3\frac{13}{17}$ bu.
7. - - - $3\frac{13}{17}$
8. - - - £$19\frac{7}{20}$
9. - - - £19 7s.
10. - - - $36\frac{5}{12}$s.
11. - - 36s. 5d.
12. - - - $8\frac{6}{16}$ lb.
13. - - 8 lb. 6 oz.
14. - - $11\frac{14}{28}$ guin.
15. - 11 guin. 14s.
16. - - $19\frac{20}{24}$ days
17. - - 19 d. 20 h.
18. - - $162\frac{17}{60}$ hours
19. - 162 h. 17 min.
20. - $120\frac{42}{365}$ years
21. - - 120 yr. 42 d.
22. - $254\frac{133}{38447}$ years
23. - - - $10\frac{37}{113}$
24. - - - $100\frac{53}{87}$
25. - - - $47\frac{11}{784}$
26. - - $740\frac{9260}{243321}$

XIV.

1. 7 days, 21 days, 91 days
2. $1 = \frac{7}{7}$, $3 = \frac{21}{7}$, $13 = \frac{91}{7}$
3. 8 days, 57 days, 107 days, 349 days
4. $1 = \frac{8}{8}$, $7\frac{1}{8} = \frac{67}{8}$, $13\frac{3}{8} = \frac{107}{8}$, $43\frac{5}{8} = \frac{349}{8}$
5. 34 weeks, 202 weeks
6. $13\frac{7}{15} = \frac{202}{15}$
7. 402 men, 2486 men
8. $\frac{403}{57}$
9. $\frac{2486}{57}$
10. $1\frac{2}{9}$ bu.
11. $\frac{398}{17}$ bbls.
12. $\frac{53}{12}$s. or 53d.
13. $\frac{167}{20}$£, or 167s.
14. $\frac{371}{24}$ day
15. 371 hours
16. $\frac{1043}{60}$
17. 1063 min.
18. $\frac{821}{11\frac{1}{2}}$ cwt.
19. 821 lb.
20. $\frac{4319}{237}$ cwt.
21. $\frac{3655}{15}$
22. $\frac{4809}{11}$
23. $\frac{17978}{2647}$

XV.

1. $\$4\frac{1}{5}$
2. $6\frac{3}{7}$ bu.
3. $37\frac{7}{9}$ bbls.
4. $17\frac{8}{9}$ tons
5. $\$2\frac{9}{20}$
6. $\$6\frac{6}{17}$
7. $\$6\frac{9}{20}$
8. $\$24\frac{9}{25}$
9. $\$21\frac{21}{40}$
10. $\$60\frac{48}{100}$
11. $\$261\frac{45}{100}$
12. $\$37\frac{1}{2}$
13. $\$108$
14. $\$330\frac{4}{5}$
15. £28 $11\frac{8}{37}$s.
16. £62 $5\frac{28}{87}$s.
17. $£16\frac{173}{235}$
18. $£35\frac{423}{987}$
19. $\$31\frac{4}{5}$
20. $\$57\frac{6}{17}$, $\$117$
21. $\$206\frac{64}{100}$
22. $\$573\frac{354}{589}$
23. $2\frac{4}{17}$
24. $1\frac{191}{215}$

25. - - - $2\frac{96}{275}$
26. - - - $1\frac{1407}{2868}$
27. - - - $\frac{7525}{17834}$
28. - - - $5\frac{3362648}{6}$
29. - - - $1\frac{1179}{2876}$
30. - - - $1\frac{9679}{18405}$
31. - - $59\frac{5283}{17063}$
32. - - $5\frac{75762}{1893700}$

XVI.

1. - - - $12
2. - $\frac{1}{3}$ of $36, $12
3. - $\frac{1}{7}$ of $1.54, $0.22
4. - $\frac{1}{9}$ of $126, $14
5. - $\frac{1}{17}$ of $136, $8
6. - - - $163
7. captain $4620
   1st mate $3080
   2d mate $2310
   sailors $539 each
8. - - 285 miles
9. - - $13.64
10. - - - $11.73
11. - $0.61, $1.22
12. - - $31.33
13. - - - $0.48
14. $1.05, $3.15, $7.35
15. - $1.65, $17.05
16. - $1.50, $26.25
17. $1.55, $3.10, $4.65
18. - - $23.20
19. - - - 14.10
20. - - $1.13, $5.65
21. - - $148.03
22. - $\frac{1}{7}$ of $2.94, $0.42
23. $\frac{1}{8}$ of $60.24, $7.53
24. $\frac{1}{12}$ of $82.44, $6.87
25. $\frac{1}{18}$ of $1692.00, $94
26. $\frac{1}{37}$ of $2.96, $0.08
27. $\frac{1}{63}$ of $52.92, $0.84
28. - - $427.42
29. - - 63,360 in.
30. - 21,600 geo. miles
31. - - 24,912 miles
32. - 950,400 in.
33. - 7,971,840 rods
34. 4,735,272,960 b. corns
35. - - - $1.25
36. $\frac{1}{8}$ of 18 bu. $\frac{5}{6}$ of 18 bu.
    15 bu.
37. in 53 h. 265 miles
38. - - 1480 miles
39. - - - $222
40. - - 235 miles
41. $1.43; $90.09; $294.58
42. - - $191.70
43. - - - $7.05
44. - - $63.52
45. - - £3 11s 4d.
46. - $99.25

47. - - 55 bu. 1 pk.
48. - - - £213
49. - - - $56
50. - - - $93.75
51. - - - $220
52. - - £17 14s. 9d.
53. - - $11.20
54. - - $13,625\frac{140}{186}$
55. 7167 & a fraction over
56. - - $64,984\frac{720}{1170}$
57. - $\frac{1}{3}$ bu. $\frac{2}{3}$ bu.
58. - - $\frac{1}{3}$ bu. $\frac{3}{3}$ bu.
59. $\frac{1}{3}$ gal. $\frac{2}{3}$ gal. $\frac{3}{3}$ gal. $1\frac{1}{3}$ gal.
60. $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; $\frac{7}{5} = 1\frac{2}{5}$
61. $\frac{1}{7}$ $\frac{2}{7}$; $\frac{6}{7}$; $\frac{10}{7} = 1\frac{3}{7}$ dolls.
62. $\frac{1}{7}$; $\frac{2}{7}$; $\frac{6}{7}$; $\frac{10}{7} = 1\frac{3}{7}$
63. $\frac{1}{13}$ gal. $\frac{2}{13}$ gal. &c. $\frac{23}{13} = 1\frac{10}{13}$ gal. $\frac{57}{13} = 4\frac{5}{13}$ gals.
64. $\frac{1}{13}$; $\frac{2}{13}$, &c. $\frac{57}{13} = 4\frac{5}{13}$
65. $\frac{1}{23}$dol. $\frac{2}{23}$dol. &c. $\frac{34}{23} = 1\frac{11}{23}$, $\frac{87}{23} = 3\frac{18}{23}$dols. $\frac{253}{23} = 11$ dols.
66. $\frac{1}{23}$, $\frac{2}{23}$, &c. $\frac{87}{23} = 3\frac{18}{23}$, $\frac{253}{23} = 11$
67. $\frac{53}{8} = \$6\frac{5}{8}$; $\$86.12\frac{4}{8}$
68. $8\frac{7}{17}$ cts.
69. $\$6.31\frac{14}{17}$
70. $\$66.92\frac{7}{311}$
71. $\$532.83\frac{15}{63}$
72. $\$856.66\frac{136}{189}$
73. $\frac{2}{3}$ bu. $3\frac{1}{3}$ bu.

In doing these examples, make the pupil learn to *express* division, as explained in the book, Part II. Art. XVI.

74. $\frac{5}{8}$ bbl. $10\frac{5}{8}$ bbls.
75. $\frac{5}{23}$ bbl. $16\frac{7}{23}$ bbls.
76. $\frac{3}{43}$ acre, $\frac{21}{43}$ acre, $1\frac{41}{43}$ acre, $10\frac{29}{43}$ acres
77. $\frac{495}{290}$ pk. $\frac{49500}{290} = 1706\frac{230}{290}$ pks. $= 426$ bu. $2\frac{23}{29}$ pks.
78. $\frac{37}{1368}$ rood. $\frac{37}{1368} \times 500 = \frac{18500}{1368} = 136\frac{452}{1368}$ roods $= 34$ acres, $0\frac{452}{1368}$ roods.
79. 1 man will consume $\frac{96}{4365}$ bbl. and $\frac{96}{4365} \times 2426 = 535\frac{1715}{4365}$ bbls. Or 1 man will consume $\frac{1}{4365}$ of 96 bbls. and 2426 men will consume $\frac{2426}{4365}$ of 96 bbls.

Ans. $535\frac{1715}{4365}$ bbls.

80. - - - $5.43\frac{3}{8}$
81. - - $12.54\frac{1}{5}$
82. - - - 12s.
83. - - - 9d.
84. - - - $7\frac{4}{8}$d.
85. - - - $2\frac{3}{5}$ qrs.
86. - - - $7\frac{1}{5}$d.
87. - - 6d. $3\frac{3}{7}$ qrs.
88. - - - 7s. 6d.
89. - 14s. 3d. $1\frac{5}{7}$ qrs.
90. - 4s. 3d. $1\frac{5}{7}$ qrs.
91. 13 h. 42 min. $51\frac{3}{7}$ sec.
92. - 22 min. 30 sec.
93. 9 h. 13 min. $50\frac{10}{13}$ sec.
94. 6 h. 43 min. 12 sec.
95. - - - - 6 oz.
96. - - 2 qrs. 8 lb.
97. 1 qr. 4 lb. $15\frac{1}{17}$ oz.
98. - 17 galls. 2 qts.
99. 8 galls. 2 qts. 1 pt. $2\frac{3}{5}$ gills.
100. - 2 qrs. $1\frac{1}{7}$ nls.
101. - 3 qrs. $1\frac{1}{11}$ nl.
102. - 1 qr. $1\frac{11}{17}$ nl.
103. - - $0.428\frac{4}{7}$
104. - - $0.178\frac{16}{25}$
105. - - $0.127\frac{31}{47}$
106. - 7s. 9d. $3\frac{15}{25}$ qrs.
107. - 7s. 6d. $3\frac{9}{37}$ qrs.
108. - - 9s. $7\frac{5}{73}$d.
109. 1 qt. 1 pt. $3\frac{11}{87}$ gills.
110. - - - $6\frac{6}{53}$d.
111. - - 16 hours
112. - - $0.20
113. - - $3\frac{13}{25}$ qrs.
114. - 1 pk. $5\frac{17}{43}$ qts.
115. - 7 oz. $12\frac{23}{37}$ dr.
116. - 5s. 3d. $1\frac{69}{87}$ qrs.
117. 12s. $9\frac{30}{130}$ d.
118. 8s. 6d. $3\frac{123}{287}$ qrs.
119. 1 qr. 5 lb. 11 oz. $15\frac{1}{8}\frac{1}{5}\frac{7}{9}$ drs.
120. 2 d. 16 h. 8 min. $17\frac{919}{1573}$ sec.
121. 22 gals. $3\frac{2}{6}\frac{5}{8}\frac{4}{4}$ qts.
122. In this example find $\frac{2}{4}\frac{3}{7}\frac{3}{7}$ of a hhd. in galls. and then multiply the price of 1 gall. by it; or first find the price of 1 hhd. and take $\frac{2}{4}\frac{3}{7}\frac{3}{7}$ of that. The latter method is generally preferable. *Ans.* $37.85\frac{72}{477}$.
123. $8.10\frac{10}{642}$
124. $350.
125. $63.66\frac{2}{36}$
126. $260.06\frac{1}{2}$
127. $2174.88\frac{16}{43}$
128. $4231.65\frac{21}{35}$

129. 4 bushels will come to 20s. then 3 pks. 5 qts. = 29 qts. = $\frac{29}{32}$ bu. $\frac{29}{32}$ of 5s. = 4s. $6\frac{12}{32}$d. *Ans.* £1 4s. $6\frac{12}{32}$d.

130. 3 cwt. will come to $27; 2 qrs. 7 lb. = $\frac{63}{112}$ cwt $\frac{63}{112}$ of $9 = 5.06\frac{28}{112}$ *Ans.* 32.06\frac{28}{112}$

131. $1348.50

132. 28.86\frac{228}{252}$

133. $\frac{747}{44352}$d. per grain. This multiplied by the number of grains in an ounce will give the price of an ounce. Ans. 6s. $8\frac{4003}{4432}$d.

134. 1.19\frac{7501}{10021}$

135. Reduce the 34 tons, &c. to pounds, and make it the denominator, and $6500.00 the numerator of a fraction; this will be the price of 1 pound in parts of a cent. Multiply this by the number of pounds in a ton, and reduce it, and it will be the answer. Ans. 188.49\frac{65542}{71242}$

136. $0.055 per lb.

137. 4.055\frac{5}{87}$ per yd.

138. 0.244\frac{100}{500}$ per lb.

139. - $1.56 per gal.

140. - - - $325

141. 1.507\frac{59}{63}$ per gal.

142. - $6.50 per bbl.

143. - 6.685\frac{25}{35}$ per yd.

144. - $0.36 per gal.

145. - 0.178\frac{448}{784}$ per lb.

146. 0.028\frac{1}{7}\frac{15}{8}\frac{1}{4}$ per lb.

147. It will take 1 boarder 8 times as long, that is, 96 days; and it would take 12 boarders $\frac{1}{12}$ part of that time, or 8 days. Ans. 8 days.

148. - - 92 men

149. - - 42 men

150. - - $14\frac{14}{14}$ days

151. - - $11\frac{7}{38}$ days

152. - - 12 days

153. - - $20\frac{4}{13}$ days

154. - $27\frac{15}{25}$ miles

155. - - $33\frac{4}{9}$ bu.

156. Find how many men it would take, if the days were one hour long, and then how many, when they are 11 hours. Ans. 15 men.

157. Find how many months it would take them, if they worked only 1 hour in a day, and then how many, if they worked 10 hours. Ans. $3\frac{5}{10}$ months.

158. A's share \$576, B's \$288

159. A's share \$2994.008$\frac{6}{48}$
B's do. \$3346.244$\frac{18}{48}$
C's do. \$2113.417$\frac{24}{48}$

160. Both together paid \$8, B paid $\frac{5}{8}$, and C $\frac{3}{8}$ of it. They ought to receive in the same proportion.

161. \$100. C $\frac{47}{100}$ and D $\frac{53}{100}$
C's share 29$\frac{61}{100}$ galls. D's 33$\frac{39}{100}$ galls.

162. C's share $\frac{850}{29719}$ of \$1353.18 = \$386.103$\frac{2163}{29719}$
D's do. $\frac{9423}{29719}$ of do. = \$427.893$\frac{2315}{29719}$
E's do. $\frac{11187}{29719}$ of do. = \$539.182$\frac{1483}{29719}$

163. A's share \$1397.653$\frac{745}{38835}$
B's do. \$5241.199$\frac{1835}{38835}$
C's do. \$3843.546$\frac{1090}{38835}$
D's do. \$2620.599$\frac{2835}{38835}$
E's do. \$297.001$\frac{1164}{38835}$

164. F's share \$3277.50
G's do. \$6397.50
H's do. \$5325

165. The first \$9.333$\frac{6}{18}$
The second \$14
The third \$18.666$\frac{12}{18}$

166. A receives \$179.777$\frac{724}{5788}$
B " \$402.187$\frac{644}{5788}$
C " \$914.295$\frac{540}{5788}$
D " \$1476.740$\frac{2880}{5788}$

The last nine examples are what is usually called *Simple Fellowship*, for which we deduce the following rule:—Find the stock invested, and make it the denominator, and each man's particular share the numerator of a fraction. These fractions will express each man's proportion of the sum to be received or to be paid.

167. - 18106$\frac{1086}{2165}$ 169. - - - $\frac{169}{1868}$
168. - - 22$\frac{1632}{4877}$ 170. - - - 1$\frac{611}{9755}$

171. - - - $2\frac{603}{854}$
172. - - - $3\frac{6449}{854}$
173. - - $677\frac{139}{356}$
174. - - $677\frac{139}{356}$
175. - - $29\frac{193}{257}$
176. - - $29\frac{182}{251}$
177. - - $133\frac{446}{1000}$
178. - - $133\frac{446}{1000}$
179. - - $18\frac{121}{1305}$
180. - - $18\frac{121}{1305}$

XVII.

1. - - - $\frac{1}{8}$ dol.
2. - $\frac{2}{5}$ dol. $3\frac{1}{5}$ dols.
3. - - $\frac{1}{5}$ bbl.
4. - $\frac{3}{17}$ ton. $1\frac{16}{17}$ ton
5. - - $\$10\frac{44}{50}$
6. - - - $\$30\frac{1}{3}$
7. - - $137\frac{3}{5}$ shil.
8. - $7\frac{4}{5}$ bu. 390 bu.
9. - - $126\frac{6}{8}$ bu.
10. - - - $\$107\frac{2}{8}$
11. - - $5\frac{2}{11}$ miles
12. - - $59\frac{3}{5}$ miles
13. - - $5\frac{2}{11}$ bu.
14. - - - $\$7\frac{6}{8}$
15. - - $\$24\frac{64}{100}$

Observe that in all the above examples, the division may be performed by dividing the numerator. In most of those which follow this cannot be done.

16. - $\frac{1}{4}$ of a melon
17. - $\frac{1}{8}$ of the apple
18. - $\frac{3}{8}$ of a bushel
19. - - - - $\frac{3}{8}$
20. - - $\frac{1}{6}$ bushel
21. - - - $\frac{1}{6}$
22. - - - $\frac{1}{10}$ bbl.
23. - - - $\frac{1}{10}$
24. - - $\frac{2}{12}$ bbl.
25. - - - $\frac{2}{12}$
26. - - $\frac{2}{27}$ dol.
27. - - - $\frac{2}{27}$
28. - $\frac{2}{45}$ dol.

29. $\frac{1}{6}$ dol. $\frac{2}{6}$ dol. $\frac{7}{6} = 1\frac{1}{6}$ dol.
30. $\frac{1}{6}$. $\frac{2}{6}$. $\frac{7}{6} = 1\frac{1}{6}$
31. $\frac{3}{35}$ dol. $\frac{15}{35}$ dol. $\frac{45}{35} = 1\frac{10}{35}$ dol.
32. $\frac{3}{35}$. $\frac{15}{35}$. $\frac{45}{35} = 1\frac{10}{35}$
33. $\frac{12}{120}$ of the loss

34. He sold $\frac{12}{275}$. He owned at first $\frac{3}{25}$ of the whole. $\frac{1}{25} = \frac{11}{275}$ and $\frac{3}{25} = \frac{33}{275}$; out of these he sold $\frac{12}{275}$, consequently he had $\frac{21}{275}$ left. Ans. He sold $\frac{12}{275}$, and had $\frac{21}{275}$ left.

35. $5\frac{1}{2} = \frac{11}{2}$; $\frac{1}{3}$ of $\frac{11}{2}$ is $\frac{11}{6}$, and $\frac{2}{3}$ of $\frac{11}{2}$ is $\frac{22}{6} = 3\frac{4}{6}$. Ans. $3\frac{4}{6}$ dollars

36. $1\frac{5}{6}$. $3\frac{4}{6}$

37. $1\frac{5}{12}$ bu. $4\frac{3}{12}$ bu.

38. $1\frac{5}{12}$. $4\frac{3}{12}$, or $4\frac{1}{4}$

39. $\$145\frac{26}{85} = \$145.305\frac{75}{85}$

40. $145\frac{26}{85}$

41. $\frac{1099}{384}$ dol. $\frac{1099}{10752}$ dol. $= \$0.102\frac{2296}{10752}$

42. $59\frac{1}{16}$ gals.

43. $50.00

44. $\$15\frac{45}{152} = \$15.296\frac{8}{152}$

45. $\$\frac{16}{128}$. $\$\frac{752}{1134} = \$0.663\frac{158}{1134}$

46. $\$3\frac{128}{660} = 3.648\frac{28}{660}$

47. $\$2\frac{240}{252} = \$2.952\frac{96}{252}$

48. $\$16\frac{8}{60} = \$16.133\frac{20}{60}$

49. $\$4\frac{37}{50} = \$4.74$

50. $\$\frac{12}{175} = \$0.068\frac{100}{175}$

51. $26\frac{1}{15}$s$= £1.$ 6s. $0\frac{12}{15}$d.

52. - - - $\frac{1}{8}$ bbl. 55. - - $3\frac{8}{16}$ gals.

53. - - - $\frac{1}{12}$ yd. 56. - - - $5\frac{10}{21}$ qts.

54. - - - $2\frac{3}{4}$ yds. 57. - - $7\frac{6}{11}$ bbls.

58. $\$25\frac{2}{24} = \$25.083\frac{8}{24}$

59. $5. $\$15\frac{8}{24} = \$15.75$

60. $£15\frac{115}{300} = £15$ 7s. 8d.

In this example, say £17 15s. $= £17\frac{15}{20} = £\frac{355}{20}$; then $\frac{13}{15}$ multiplied by $\frac{355}{20} = £15\frac{115}{300}$.——Or first multiply $\frac{13}{15}$ by 17, which makes $£14\frac{11}{15} = £14$ 14s. 8d. If he can pay $\frac{13}{15}$ of a pound on a pound, he can pay $\frac{13}{15}$ of the whole debt, but we have already taken $\frac{13}{15}$ of £17, we have now to take $\frac{13}{15}$ of 15s. which is 13s.; this added to £14 14s. 8d. makes £15 7s. 8d. as before.

61. $\frac{17}{20}$£; consequently he can pay $\frac{17}{20}$ of the whole debt, or $\frac{17}{20}$ of a shilling on a shilling. Ans. £125 10s. $10\frac{8}{20}$d.

62. - - - $\frac{7}{37}$ 74. - - $4\frac{4}{5}$ times

63. - - - $\frac{4}{135}$ 75. - - - $5\frac{34}{135}$

64. - - - $\frac{4}{128}$ 76. - - $14\frac{33}{35}\frac{4}{7}$

65. - - - $\frac{3}{105}$ 77. - - - $\frac{3}{16}$

66. - - - $\frac{53}{8175}$ 78. - - - $\frac{4}{105}$

67. - - - $\frac{53}{21775}$ 79. - - - $\frac{47}{10674}$

68. - - - $1\frac{118}{880}$ 80. - - - $\frac{73}{153758}$

69. - - - $1\frac{118}{880}$ 81. - - - $\frac{23}{24}$

70. - - - $2\frac{959}{49375}$ 82. - - - $\frac{118}{1524}$

71. - - - $2\frac{106}{133}$ 83. - - - $\frac{287}{12336}$

72. - - - 3329$\frac{62}{55}$ 84. - - - $\frac{898}{23478}$

73. - - 28851$\frac{268}{360}$

XVIII.

1. $\frac{1}{2}$ $1

Be careful to make the learner perform these examples by dividing the denominator

2. $\frac{1}{3}$. $\frac{1}{4}$. $1

3. $\frac{5}{4} = 1\frac{1}{4}$ bu. $\frac{5}{2} = 2\frac{1}{2}$ bu. 5 bu.

4. $\frac{4}{3} = 1\frac{1}{3}$ bu. 4 bu.

5. $\frac{1}{8}$ of it. $\frac{1}{4}$. $\frac{1}{3}$. $\frac{1}{2}$. The whole

6. $\frac{3}{20}$ bbl. $\frac{3}{8}$ bbl. $\frac{3}{7}$ bbl. $\frac{3}{5}$ bbl. 3 bbl.

7. $8\frac{3}{2} = 9\frac{1}{2}$ bu. 19 bu.

8. $35\frac{3}{4}$ bbls.

9. $\frac{43}{124}$ ton. $\frac{43}{31} = 1\frac{12}{31}$ ton

10. $8\frac{19}{3} = 14\frac{1}{3}$ yds. 43 yards

11. $32$$\frac{7}{10} = $32.70. $81$$\frac{3}{4} = $81.75

12. - - - $\frac{4}{5}$ 14. - - $\frac{73}{5} = 14\frac{3}{5}$

13. - - - $7\frac{1}{6}$ 15. - - - $1\frac{10}{21}$

16. - - - $1\frac{104}{109}$
17. - - - $1\frac{46}{171}$
18. - - - $48\frac{7}{10}$
19. - - - $1217\frac{1}{2}$
20. - - - $411\frac{19}{179}$
21. - - - 7
22. - - - 4
23. - - - 15
24. - - - 11
25. - - - 38
26. - - - 327
27. - - - 1114
28. - - - 14186
29. - - - 12069
30. - - - 14095

XIX.

1. - - 95 yds.
2. - $16\frac{7}{8}$ = $16.875
3. - - $88\frac{9}{10}$ bu.
4. - - $5\frac{1}{4}$ bu.
5. - - - $2\frac{1}{6}$ yds.
6. - - $18\frac{5}{12}$ lb.
7. - $\frac{1}{4}$ of the apple
8. $24\frac{7}{8}$ = $24.875
9. - - $22\frac{1}{10}$ cwt.
10. - - $15\frac{5}{8}$ yds.
11. - - $45\frac{2}{21}$ bu.
12. $14\frac{4}{15}$ cwt. = 14 cwt. 1 qr. $1\frac{1}{15}$ lb.
13. $1\frac{6}{35}$ tons = 1 T. 3 cwt. 1 qr. 20 lb.
14. - $\frac{9}{40}$ above water
15. - - - $6\frac{2}{5}$ cwt.
16. - - $23\frac{5}{6}$ gals.
17. - - $41\frac{1}{60}$ cwt.
18. - - $38\frac{12}{119}$ cwt.
19. - $13\frac{5}{77}$ years old
20. - $28\frac{101}{117}$ years old
21. - - $5\frac{37}{85}$ years
22. - - - $\frac{54}{91}$
23. - - - $1\frac{117}{140}$
24. - - - $\frac{86}{231}$
25. - - - $30\frac{5}{12}$
26. - - - $407\frac{3}{7}$
27. - - - $\frac{4}{15}$
28. - - - $\frac{4}{21}$
29. - - - $4\frac{8}{11}$
30. - - - $38\frac{29}{35}$
31. - - - $14\frac{432}{175}$
32. - - $528\frac{167}{1681}$

XX.

1.	- - -	$23	16.	- - -	$12\frac{1}{2}$
2.	- - -	$5.29	17.	- - -	$27\frac{1}{18}$
3.	- - -	$7.37	18.	- - -	$49\frac{1}{22}$
4.	$406\frac{4}{21} =	406.19\frac{1}{21}$	19.	- -	$601\frac{1}{63}$
5.	$1\frac{50}{63} =	1.793\frac{41}{63}$	20.	- - -	$176\frac{31}{112}$
6.	$28\frac{7}{30} =	28.233\frac{10}{30}$	21.	- - -	$146\frac{1}{10}$
7.	-	$44\frac{3}{14}$ lb.	22.	- - -	$129\frac{37}{50}$
8	- -	$76\frac{59}{63}$ hhds.	23.	- - -	$4\frac{73}{400}$
9.	- -	$14\frac{154300}{}$ bbls.	24.	-	$1\frac{964}{1000} = 1\frac{241}{250}$
10.	- -	$27\frac{28}{45}$ tons	25.	- - -	$403\frac{3}{25}$
11.	- -	$401\frac{138750}{230000}$	26.	- -	$86\frac{18137}{47000}$
12.	- - -	28	27.	$9\frac{24640600}{30000000} =	$9\frac{12320300}{15300000}$
13.	- - -	28	28.	- $12\frac{18387}{860000} =	$12\frac{20043}{40000}$
14.	- - -	24	29.	- -	$1866\frac{353}{420}$
15.	- - -	42	30.	- -	$31\frac{2140141}{800000}$

XXI.

1. The divisors
of 15 are 3, 5*
‘ 18 ‘ 2, 3, 6, 9
‘ 20 ‘ 2, 4, 5, 10
‘ 21 ‘ 3, 7
‘ 24 ‘ 2, 3, 4, 6, 8, 12
‘ 28 ‘ 2, 4, 7, 14
‘ 42 ‘ 2, 3, 6, 7, 14, 21
‘ 48 ‘ 2, 3, 4, 6, 8, 12, 16, 24
‘ 64 ‘ 2, 4, 8, 16, 32
‘ 72 ‘ 2, 3, 4, 6, 8, 9, 12, 18, 24, 36
‘ 88 ‘ 2, 4, 8, 11, 22, 44
‘ 98 ‘ 2, 7, 14, 49

* Every number is divisible by itself.

2. The divisors
of 108 are 2, 3, 4, 6, 9, 12, 18, 27, 36, 54
' 112 ' 2, 4, 7, 8, 14, 16, 28, 56
' 114 ' 2, 3, 6, 19, 38, 57
' 120 ' 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60
' 387 ' 3, 9, 43, 129
' 432 ' 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 27, 36, 48, 54, 72, 108, 144, 216
' 846 ' 2, 3, 6, 9, 18, 47, 94, 141, 282, 423
' 936 ' 2, 3, 4, 6, 8, 9, 12, 13, 18, 24, 26, 36, 39, 52, 72, 78, 104, 117, 156, 234, 312, 468

3. The divisors
of 8000 are 2, 4, 5, 8, 10, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 160, 200, 250, 320, 400, 500, 1000, 1600, 2000, 4000
' 4053 ' 3, 1351
' 1864 ' 2, 4, 8, 233, 466, 932
' 2480 ' 2, 4, 5, 8, 10, 16, 20, 40, 62, 124, 155, 248 310, 496, 620, 1240
' 24,876 ' 2, 3, 4, 6, 9, 12, 18, 36, 691, 1382, 2073, 2764, 4149, 6219, 8292, 12438
' 103,284 ' 2, 3, 4, 6, 9, 12, 18, 36, 2869, 5738, 8607, 11476, 17214, 25821, 34428, 51642
' 7,328,472 ' 2, 3, 4, 6, 8, 12, 24, 305353, 610706, 916059, 1221412, 1832118, 2442824, 3664236

4. - - 2, 4, 8
5. - - - 2, 4
6. - - - 2, 3, 6
7. - - - 7
8. - - - 2, 4, 8
9. - - - - 3
10. - - - 2, 4, 8
11. - - 2, 3, 6, 18
12. - - - 3, 9
13. - - - - $\frac{1}{3}$
14. - - - $\frac{4}{25}$
15. - - - $\frac{5}{7}$
16. - - - $\frac{1}{5}$
17. - - - $\frac{1}{30}$
18. - - - $\frac{1583}{12811}$
19. - - - $\frac{5}{105}$

XXII.

1. - - - $\frac{9}{12}, \frac{4}{12}$
2. - - - $\frac{27}{36}, \frac{8}{36}$
3. - - - $\frac{20}{24}, \frac{9}{24}$
4. - - - $\frac{21}{28}, \frac{10}{28}$
5. - - - $\frac{15}{36}, \frac{14}{36}$
6. - - - 24
7. - - - 56
8. - - - 45
9. - - - 90
10. - - - 210
11. - - - 840
12. - - - 1680
13. - - - 1440
14. - - - 10,500
15. - - - 13,500
16. - - $\frac{21}{224}, \frac{40}{224}$
17. - - - $\frac{8}{54}, \frac{7}{54}$
18. - - $\frac{75}{270}, \frac{80}{270}, \frac{81}{270}$
19. $\frac{96}{216}, \frac{135}{216}, \frac{126}{216}, \frac{64}{216}$
20. - $\frac{156}{975}, \frac{45}{975}, \frac{130}{975}$
21. - $\frac{2106}{46008}, \frac{3337}{46008}$
22. - - $\frac{280}{28000}, \frac{43}{26000}$
23. - - $\frac{276}{3000}, \frac{175}{3000}$
24. - - $\frac{435}{72000}, \frac{57}{72000}$

XXIII.

1. - 15 bu.; $7\frac{1}{2}$ bu.
2. 30 peaches; 15 do.
3. 24 labourers; 8 do.
4. - - 24 acres
5. - - $67\frac{1}{7}$ boxes
6. - - $236\frac{1}{4}$ bottles
7. - - $46\frac{2}{3}$ weeks
8. 80 days; 160 persons
9. - - $184\frac{2}{13}$ days
10. - - $871\frac{1}{9}$ axes
11. - - 12 acres
12. - - $19\frac{1}{8}$ acres
13. - - $12\frac{1}{2}$ bu.
14. - - $11\frac{1}{5}$ bbls.
15. - - $4\frac{37}{47}$ acres
16. - - - $1\frac{4}{5}$ tons
17. - - $443\frac{3}{15}$ lb.
18. - - $62\frac{24}{93}$ days
19. $57\frac{4}{5}$ coats
20. $7\frac{9}{11}$ rods = 7 rods, $4\frac{1}{2}$ yds.
21. $15\frac{9}{11}$ rods = 15 rods, $4\frac{1}{2}$ yds.
22. $51\frac{2}{33}$ rods = 51 rods, 3 yds. 2 ft. 6 in.
23. $3\frac{492}{660}$ fur. = 3 fur. 29 rods, 4 yds. 2 ft. 6 in.
24. $8\frac{51}{165} = 8\frac{17}{55}$ miles = 8 miles, 2 fur. 18 rods, 5 yds.

25. - - - 3 bu.
26. - 4 dozen; 7 do.
27. - 2 dozen; $6\frac{1}{2}$ do.
28. - $2\frac{1}{3}$ bu. $14\frac{1}{3}$ bu.
29. - - 4 lb. 9 lb.
30. - - - $4\frac{1}{2}$ bu.
31. - - $2\frac{1}{4}$ weeks
32. - - 6 lb. 12 lb.
33. - $6\frac{2}{5}$ bu. $2\frac{2}{15}$ bu.
34. - $5\frac{3}{8}$ bu. $2\frac{4}{8}$ bu.
35. - - $\frac{1}{3}$ bu. $\frac{2}{3}$ bu.
36. - - $\frac{2}{8}$ bu. $\frac{4}{8}$ bu.
37. - 54 eggs
38. - $11\frac{1}{4}$ penny loaves
39. $2\frac{13}{16}$ four-penny loaves
40. $11\frac{1}{4}$ two-penny loaves. $58\frac{1}{8}$ do.
41. $2\frac{4}{8}$ six-penny loaves. 14 do.
42. - - $7_{\frac{1}{10}}$ hats
43. - - $7_{\frac{1}{10}}$ hats
44. - - $9\frac{15}{20}$ bu.
45. - - $9\frac{15}{20}$ bu.
46. - - $25_{\frac{1}{4}}$ coats
47. - - $7\frac{11}{28}$ weeks
48. - - $19\frac{208}{279}$ suits
49. - $19_{\frac{847}{887}}$ days
50. - - $44\frac{37}{90}$ cows
51 - $3\frac{3144}{8064}$ chaldrons
52. - - $17_{\frac{4687}{8833}}$ cwt.
53. - $15\frac{2026}{4977}$ casks
54. $30\frac{17}{191}\frac{435}{858} = 30\frac{58}{63}\frac{845}{776}$ tons
55. - - $91\frac{4}{8}$ times
56. - - $370_{\frac{4}{13}}$ times
57. - - $13_{\frac{6}{1888}}$ times
58. - $39\frac{3119}{4819}\frac{28}{19}$ times
59. - - $16\frac{24}{35}$ times
60. - - $139_{\frac{7}{12}}$ times
61. - - $6_{\frac{61}{117}}$ times
62. - - $6\frac{3264}{4921}$ times
63. - - - $59\frac{14}{41}\frac{47}{12}$
64. - - - $\frac{1}{24}$ bbl.
65. - $\frac{1}{21}$ bbl. $\frac{2}{21}$ do.
66. $\frac{1}{8}\frac{1}{9}$ cwt. $\frac{3}{39}$ do. $\frac{1}{39}$ do.
67. - - $\frac{2}{8}\frac{3}{4}\frac{0}{1}$ ton

68 $\frac{7}{8} = \frac{35}{40}$, and $\frac{3}{4} = \frac{16}{40}$. Ans. $\frac{16}{35}$ of a bushel

69. $2\frac{3}{5} = 1\frac{3}{5} = \frac{91}{55}$, and $3\frac{3}{7} = \frac{23}{7} = \frac{115}{35}$

These being reduced to a common denominator have the same relation as their numerators; therefore take the numerators and proceed with them as if they were whole numbers. See Art. XVI. example 158, and the following. $115 + 91 = 206$. One paid $\frac{115}{320}$ and the other $\frac{91}{320}$ of the whole, and they should have the same proportions. Ans. $\frac{91}{320}$ and $\frac{115}{320}$ respectively.

70. $5\frac{1}{2} = \frac{11}{2} = \frac{33}{6}$, and $7\frac{2}{3} = \frac{23}{3} = \frac{46}{6}$. $33 + 46 = 79$

The first should pay $\frac{33}{79}$, and the second $\frac{46}{79}$ of 21 dolls. Ans.

$8\frac{1}{11} = 8.\ 8.77\frac{7}{11}$, and $12\frac{1}{11} = 12.22\frac{2}{11}$ respectively.

71. - - - $\frac{126}{325}$
72. - - - $\frac{287}{1111}$
73. - - - $\frac{8394}{9625}$
74. - - $\frac{46}{1562991}$
75. - - - $-\frac{8}{51}$
76. - - - $\frac{141}{1313}$
77. - - - $\frac{1278}{2670}$
78. - - $\frac{144197}{2023814}$
79. - - $\frac{74}{161861?}$

XXIV.

1. - - - $1.50
2. - - $26.75
3. - - - $8.625
4. - - - $108
5. - - $192.80
6. - - $99.44
7. - - $127005
8. - - $233334
9. - - $474679.66
10. - - $215665.58
11. - - - $\frac{2}{3}$ doll.
12. - - - $\frac{3}{4}$ doll.
13. - - - $1\frac{3}{7}$
14. - - - $2\frac{2}{5}$
15. - - - $6\frac{12}{25}$
16. - - - $98\frac{1}{8}$
17. - - $113\frac{9}{17}$
18. - - $198760\frac{334}{1013}$
19. - - - $0.40
20. - - 8 cents
21. - - $2. $8
22. - $0.30. $2.40
23. - $0.19. $1.52
24. - - $2. $10
25. - $0.60. $4.20
26. - - . $20
27. - - 40 miles
28. - - - $6.79
29. 24 years is $\frac{3}{8}$ of his age.
Ans. 64 years
30. - - $91.26
31. - $7\frac{1}{2} = $7.50
32. - $5\frac{2}{3}$ cents. $0.45\frac{1}{3}$
33. - - $2\frac{4}{5}$ cents
34. $1\frac{1}{4} = 1.25.$ $16\frac{1}{4} = 16.25$
35. $6\frac{2}{3}$ miles.
36. $74666\frac{2}{3} = 74666.66\frac{2}{3}$
37. $18750.
38. $305075\frac{2}{28} = 305075.89\frac{2}{7}$
39. $6\frac{3}{7} = 6.60$

40. $2\frac{1}{4} = \frac{1}{5}^{3}$. $\frac{1}{13}$ of 13s. is 1s. and $5 \times 1 = 5$. Ans. 5s.
41. $8\frac{9}{13} = \frac{113}{13}$; $\frac{1}{113}$ of 15 is $\frac{15}{1\,13}$, and 13 times this is $\frac{195}{113} = \$1\frac{82}{113}$. $\$86\frac{32}{113} = 86.28\frac{36}{113}$
42. Find the price of 1 cwt., as in the last, and let it stand in the form of an improper fraction; then reduce $17\frac{1}{2}$ to an improper fraction and multiply by it. Ans. $\$198\frac{143}{113} = \$198.19\frac{66}{113}$
43. $\$\frac{2}{37}$. $\$\frac{10}{37}$
44. $\$\frac{2}{43}$. $\$\frac{8}{43}$
45. $\$\frac{10}{63}$
46. $1\frac{59}{156}$ month. $7\frac{233}{156}$ do.
47. $\$10\frac{4}{15}$. $\$178\frac{33}{60} = 178.38\frac{1}{3}$
48. $\$145\frac{7}{20} = 145.35$
49. $\$4\frac{17}{225} = 4.07\frac{5}{9}$
50. $\$5\frac{10}{33}\frac{17}{55} = 5.30\frac{21}{671}$
51. $1\frac{437}{1379}$ bbls. $\frac{1379}{1816}$ yds.
52. $£\frac{182}{220} = 17s.\ 2\frac{3}{11}d.$
53. $£93\frac{27}{56} = £93\ 9s.\ 7\frac{1}{7}d.$
54. He sold $\frac{6}{35}$ of the whole. The vessel was worth $49000
55. $£2653\frac{3}{49} = £2653\ 1s.\ 2\frac{34}{49}d.$
56. $91\frac{73}{283}$ days
57. $7\frac{7}{34}$ days
58. $52\frac{104}{245}$ acres
59. There is $\frac{4}{35}$ of it in the mud; and in the mud and water both there is $\frac{14}{35}$ of it; therefore $7\frac{3}{8}$ is $\frac{21}{35}$ of the whole pole. Ans. $12\frac{7}{24}$ ft. = 12 ft. $3\frac{1}{2}$ inches.

60.	-	-	-	$160	67.	-	-	-	$24\frac{3}{38}$
61.	-	-	-	$120	68.	-	-	-	$52\frac{16}{19}$
62.	-		-	72	69.	-	-		$5162\frac{10}{18}$
63.	-	-	-	864	70.	-	-	-	$3681\frac{37}{78}$
64.	-	-	-	$95\frac{1}{5}$	71.	-	-	-	$254\frac{53}{126}$
65.	-	-	-	$173\frac{1}{13}$	72.	-	-		$22162\frac{37}{81}$
66.	-	-	-	$1585\frac{17}{25}$	73.	-	-		$4134\frac{70}{93}$

74. - - - $4\frac{1}{3}$.
75. - - - $\frac{14}{27}$
76. - - - $1\frac{11}{21}$
77. - - - $\frac{15}{56}$
78. - - - $1\frac{8}{135}$
79. - - - $1\frac{271}{288}$
80. - - $2\frac{154}{1218} = 2\frac{11}{87}$
81. - $\frac{1474}{3468} = \frac{737}{1734}$
82. - $1\frac{189}{6579} = 1\frac{21}{731}$
83. - - $55\frac{814}{20025}$
84. - $7\frac{112}{2116} = 7\frac{14}{27}$
85. - - $173\frac{168}{2088}$
86. - - $216\frac{376}{3087}$
87. - $241\frac{68}{108} = 241\frac{17}{27}$
88. $137\frac{2658}{46017} = 137\frac{886}{15339}$
89. $2\frac{2}{5}\frac{1}{1}\frac{6}{5}\frac{4}{2}\frac{}{5} = 2\frac{7}{17}\frac{3}{17}\frac{8}{5}$
90. $2\frac{2}{5}\frac{1}{1}\frac{6}{5}\frac{4}{2}\frac{}{5} = 2\frac{7}{17}\frac{3}{17}\frac{8}{5}$
91. - - $33\frac{2}{15}\frac{46}{39}\frac{8}{}$
92. - - $33\frac{2}{45}\frac{46}{59}\frac{8}{}$
93. - $19\frac{93}{120} = 19\frac{31}{40}$
94. - - - $19\frac{31}{40}$
95. - - $104\frac{116}{143}$
96. - - $104\frac{116}{143}$
97. - - - $67\frac{1}{3}$
98. - - $67\frac{1}{3}$ times
99. - - - $67\frac{1}{3}$
100. - - - $4\frac{43}{75}$
101. - - $4\frac{43}{75}$ times
102. - - - $4\frac{43}{75}$
103. - - - $5\frac{69}{80}$
104. - - $5\frac{69}{80}$ times
105. - - - $5\frac{69}{80}$

106. Cost \$210, gained \$42
107. First cost \$216. Gain \$27
108. Cost $\$2884\frac{1}{2} = 2884.50$. Gain \$961.50
109. $\$1.50\frac{301}{404}$ per gall.
110. Cost $266\frac{12}{13} = 266.92\frac{4}{13}$. Gain $\$80.07\frac{9}{13}$
111. Cost $\$120\frac{3}{11} = 120.27\frac{3}{11}$. Gain $\$26.72\frac{8}{11}$
112. Gain $\$2064\frac{1}{2\,2} = 2064.04\frac{6}{11}$
113. Cost $\$249\frac{1}{3} = 249.33\frac{1}{3}$. Loss $\$62.33\frac{1}{3}$
114. Cost $\$294\frac{5}{7} = 294.85\frac{5}{7}$. Loss $\$36.85\frac{5}{7}$
115. Loss $\$344\frac{8}{11} = 344.72\frac{8}{11}$
116. Whole loss $\$16.80\frac{3}{4}$. Loss per gall. $\$0.08\frac{2\,3}{2\,8}$
117. Loss per yd. $\$0.87\frac{101}{403}$
118. Cost $\$150\frac{1}{2} = 150.50$
119. Cost $\$248\frac{2}{11} = 248.18\frac{2}{11}$
120. He gained $\frac{13}{100}$ of the cost, consequently he sold them for $\frac{113}{100}$ of the cost. Divide by 113, and the quotient will be $\frac{1}{100}$ of the cost. Or, which is generally better, multiply first by 100, and divide by 113, and you will

obtain the cost. Cost $\$119\frac{5}{113} = 119.46\frac{102}{113}$. Gained $\$15.53\frac{11}{103}$

121. Gained $\$1526\frac{17}{33} = \$1526.51\frac{17}{33}$
122. Cost $\$1117\frac{1}{22} = 1117.04\frac{6}{11}$. Loss $\$134.04\frac{6}{11}$
123. Cost $331.16. Loss $82.79
124. Cost $669\frac{3}{13} = 669.23\frac{1}{13}$. Sold them for $\$756.23\frac{1}{13}$
125. Cost $215
126. Cost $\$595\frac{15}{23} = 595.65\frac{5}{23}$. Sold them for $\$458.65\frac{5}{23}$
127. 40d. = 3s. 4d. per lb.
128. $\$0.51\frac{1}{2}$ per gall.

Note. D gains 9 cents on a gallon, which is $\frac{9}{23}$ of the cost; hence 20 cents is $\frac{9}{23}$ of the cost of the brandy.

129. Age 66 years

Note. $\frac{1}{2}$ and $\frac{1}{3}$ are $\frac{5}{6}$, which added to his age makes $\frac{11}{6}$. Hence 121 is $\frac{1}{6}$ of his age.

130. $\$216\frac{2}{3} = 216.66\frac{2}{3}$
131. $950
132. $\$223.58\frac{4}{7}$
133. $\$441.66\frac{2}{3}$
134. $\$1077.77\frac{7}{9}$
135. $\$358.18\frac{2}{11}$
136. $£171\frac{3}{107} = £171$ 0s. $6\frac{78}{107}$d.
137. $\$114\frac{1}{8} = \$114.16\frac{2}{3}$
138. $\$270\frac{1}{53} = 270.75\frac{25}{53}$
139. $\$822\frac{34}{103} = 822.33\frac{1}{103}$
140. $\$96\frac{2}{13} = 96.15\frac{5}{13}$
141. $\$0.33\frac{1}{53}$
142. $\$23.22\frac{8}{31}$

Miscellaneous Examples, page 79.

1. 2 sq. in.; 3 do.; 4 do.; 5 do. 7 do.

2. 8 sq. in.; 16 do.; 24 do. 32 do.; 40 do.; 64 do.
3. 2 sq. ft.; 3 do.; 5 do.; 9 do.; 15. do.
4. 9 sq. ft.; 18 do.; 27 do.; 45 do.; 63 do.; 81 do.
5. 13 sq. in.; 26 do.; 39 do.; 104 do.
6. 16 sq. ft.; 32 do.; 48 do.; 80 do.; 128 do.; 208 do.
7. Multiply the length by the breadth
8. 234 sq. ft.
9. 13,871 sq. ft.
10. 196 sq. rods
11. 160 sq. rods
12. $9\frac{7}{17}$ rods wide
13. 144 sq. in.
14. 18 in. in length
15. 9 sq. ft.
16. $30\frac{1}{4}$ sq. yds.
17. 1296 sq. in.
18. 40 sq. rods
19. 4 roods
20. See Arithmetic, page 239
21. 39,204 sq. in.
22. 4840 sq. yds.
23. 6,272,640 sq. in.
24. 12 sq. ft.
25. 1 acre, 126 rods, or $1\frac{63}{80}$ acre
26. $32\frac{55}{52}\frac{93}{72}\frac{96}{640}$ acres = 32 acres, 14 rods, 8 yds. 1 ft. 28 in.
27. 102,400 sq. rods
28. 640 acres
29. 126,720,000,000 acres
30. 1980 sq. in.; 13 sq. ft. 108 in., or $13\frac{3}{4}$ sq. ft.
31. $110\frac{15}{160}\frac{1}{0}$ acres
32. $49\frac{41}{243}$ yds.
33. 2 cub. in.; 3 do.; &c. 8 do.
34. 12 cub. in.; 24 do.; &c. 96 do.

35. 4 cub. in.; 8 do.
36. 12 cub. in; 24 do.; 36 do.
37. 80 cub. in.; 160 do.; 240 do; 400 do; 560 do.
38. 234 cub. in.; 1170 do.; 2574 do.
39. Multiply together the length, breadth, and thickness
40. 1728 cub. in.
41. 128 cub. ft.
42. See Arithmetic, page 239
43. 221,184 cub. in.
44. 86,400 cub. in.
45. $271\frac{43}{864}$ cub. ft.
46. $23\frac{19}{36}$ cub. ft.

Note. When one dimension is given in feet and the other two in inches, multiply the numbers together without reducing the feet to inches, and divide the product by 144, and the quotient will be the answer in cubic feet. If two dimensions are in feet and one in inches, multiply them together as they are, and divide the product by 12 to reduce it to feet. In the above example, if 28 feet be reduced to inches, the operation will stand thus

$$\frac{11 \times 11 \times 28 \times 12}{1728} = \frac{11 \times 11 \times 28 \times 12}{144 \times 12}$$

rejecting the 12 from the numerator and denominator, it becomes

$$\frac{11 \times 11 \times 28}{144}$$

47. $57\frac{7}{24}$ ft. = 1 ton $7\frac{7}{24}$ ft.
48. 8 ft.
49. 345 cub. ft. $21\frac{9}{16}$ feet of wood. 2 cords $5\frac{9}{16}$ feet

XXV.

Decimal Fractions.

1.	-	-	27.6	28.	-	-	1.043
2.	-	-	14.07	29.	-	-	17.0573
3.	-	-	123.008	30.	-	-	193.0047
4.	-	-	108.5	31.	-	-	87.00106
5.	-	-	73.09	32.	-	-	95.406
6.	-	-	4.006	33.	-	-	98.006004
7.	-	-	16.001	34.	-	-	.30507
8.	-	-	.6	35.	-	-	.0807
9.	-	-	.05	36.	-	-	$42\frac{5}{10} = 42\frac{1}{2}$
10.	-	-	.007	37.	-		$84\frac{25}{100} = 84\frac{1}{4}$
11.	-	-	.0002	38.	-	-	$9\frac{8}{10} = 9\frac{4}{5}$
12.	-	-	3.42	39.	-	-	$137\frac{4}{25}$
13.	-	-	$\frac{40}{100}$ or .40	40.	-	-	$25\frac{1}{8}$
14.	-	-	$\frac{42}{100}$ or .42	41.	-	-	$18\frac{5}{8}$
15.	-	-	$\frac{300}{1000}$ or .300	42.	-	-	$11\frac{4321}{5000}$
16.	-		$\frac{80}{1000}$ or .080	43.	-	-	$163\frac{5622}{6250}$
17.	-		$\frac{385}{1000}$ or .385	44.	-	-	$72\frac{13}{2000}$
18.	-	-	7.385	45.	-	-	$4\frac{1}{4000}$
19.	-		$\frac{2000}{10000}$ or .2000	46.	-	-	$13\frac{3002\,9}{5000000}$
20.	-		$\frac{500}{10000}$ or .0500	47.	-	-	$\frac{3}{4}$
21.	-		$\frac{60}{10000}$ or .0060	48.	-	-	$\frac{5}{16}$
22.	-		$\frac{2567}{10000}$ or .2567	49.	-	-	$\frac{3}{40}$
23.	-	-	.2567	50.	-	-	$\frac{4}{3125}$
24.	-	-	13.23	51.	-	-	$\frac{3}{20000}$
25.	-	-	21.182	52.	-	-	$\frac{53}{500000}$
26.	-	-	12.5736	53.	-	-	$\frac{3001\,37}{1000000}$
27.	-	-	142.38746				

XXVI.

1. $22.295
2. $13.409 = 13\frac{409}{1000}$ bu.
3. $75.975 = 75\frac{39}{40}$ cwt.
4. $759.77625 = 759\frac{621}{800}$ bu.
5. £16.365 = £16\frac{73}{200}$
6. $8899.3799 = 8899\frac{3799}{10000}$
7. $24.015 = 24\frac{3}{200}$ yds.
8. $65.625
9. £155.245 = £155\frac{49}{200}$
10. £2.428 = 2\frac{1}{250} = £2 8s. 6\frac{18}{25}$d.
11. £95.775 = £95\frac{31}{40}$
12. $333.75
13. $468.8312 = 468\frac{1039}{1250}$ lb.
14. $9.1372 = 9\frac{343}{2500}$ tons

XXVII.

Multiplication of Decimals.

1.	$87.15	12.	.0342		
2.	$63.00	13.	$3		
3.	61.18 bu.	14.	$63		
4.	194.8 cwt.	15.	$36		
5.	74.375 = 74\frac{3}{8}$ cwt.	16.	$58		
6.	325.5 cwt.	17.	$190		
7.	1619.56	18.	$351.50		
8.	2338.911	19.	$456		
9.	808.868	20.	$4283.40		
10.	38.7555	21.	$199.50		
11.	12.528	22.	$112.50		

23.	-	-	64	45.	-	-	$197.10
24.	-	-	214	46.	-	-	$474.00625
25.	-	-	107	47.	-	-	$1938.90
26.	-	-	713.769	48.	-	-	$0.018
27.	-	-	713.769	49.	-	-	1.9665 cwt.
28.	-	-	15071	50.	-	-	10.35
29.	-	-	243.6	51.	-	-	18.802
30.	-	-	6058	52.	-	-	34.6
31.	-	-	41711.9491	53.	-	-	290.1186
32.	-	-	67418	54.	-	-	25.2885
33.	-	-	3393	55.	-	-	13.167392
34.	-	-	627120	56.	-	-	7.003215
35.	-	-	49552.25	57.	-	-	3.410004106
36.	-	-	667683.84	58.	-	-	.002012
37.	-	-	$0.06	59.	-	-	.00030021
38.	-	-	.06	60.	-	-	.06
39.	-	-	.06	61.	-	-	.008
40.	-	-	$0.36	62.	-	-	.00003
41.	-	-	$0.70	63.	-	-	.00001
42.	-	-	$1.62	64.	-	-	.000011021
43.	-	-	$2.021	65.	-		1.344290769712
44.	-	-	$39.738				

Miscellaneous Examples, page 87.

1.	-	-	$69	6.	-	-	$77.832—
2.	-	-	$946.875	7.	-	-	$360.934+
3.	-	-	$62.3656+	8.	-	-	$401.899+
4.	-	-	$57.149+	9.	-		$655.717+
5.	-	-	$39.918+	10.	-	-	$481.384+

11. 3.696+cwt. 17.351+cwt. 4.1445+cwt.

12. 43.2777+hhds. 0.24+hhds. 7.01389—hhds.

13. $3.816+

In the following examples, the nearest decimal will be given without the mark to show whether it is too large or too small.

14.	- -	$2.137	29.	- -	.7879 rod
15.	- -	$2.391	30.	- -	.1667 ft.
16.	- -	$17.973	31.	- -	.5833 ft.
17.	- -	$129.594	32.	- -	.4444 rod
18.	- -	$4.414	33.	- -	.02434 mile
19.	- -	.875 yd.	34.	- -	£0.675
20.	- -	.4375 yd.	35.	- -	.4375s.
21.	- -	.8125 lb.	36.	- -	£0.574
22.	- -	.6071 qr.	37.	- -	See book.
23.	- -	.475 qr.	38.	-	£7 14s. 11½d.
24.	- -	.25 day	39.	-	£40 3s. 4d.
25.	- -	.6841 day	40.	-	£28 4s. 8¼d.
26.	- -	.5709 day	41.	-	£120 10s. 9½d.
27.	- -	.7833 h.	42.	- -	See book.
28.	- -	.6464 h.			

43. $5\frac{2}{5} = 5.4$. 4 cwt. 3 qrs. 7 lbs. = 4.8125 cwt.
These multiplied together produce 25.9875 cwt.
Reducing the fraction to quarters, pounds, &c.

.9875
4
qrs. 3.9500
28
760
190
lbs. 26.60
16
oz. 9.6

Ans. 25 cwt. 3 qrs. 26 lb $9\frac{3}{5}$ oz.

44. 25.905 cwt. = 25 cwt. 3 qrs. 17 lb. 3⅕ oz.
45. 7s. 8d. 3 qrs.
46. 19s. 8d.
47. 2 qrs. 9 lb. 4 oz.
48. 25 lb. 12 oz.
49. 2 qrs. 26 lb. 7 oz.
50. 9d.
51. 10 lb. 12 oz.
52. 93.156 lb. = 93 lb. 2 oz.
53. 1124.16d.
54. 8 h. 18 min. 14 sec.
55. 35 min. 15 sec.
56. 3.5 ft.; 4.25 ft.; 7.75 ft.; 3.66 + ft.; 5.58 + ft.; 9.833 + ft.
57. 4 in. 1.5 barley corn.
58. 67.4 sq. in.
59. 1458 in.
60. 11.43 sq. ft.
61. 281.94 sq. ft.
62. 29.72 sq. ft.
63. 30.4 ft.
64. 204 cub. ft.
65. See book.
66. $95.078
67. $89.171
68. Gained $58.122. Whole $445.602.

69.	-	$1331.25	75.	- -	$46.744
70.	- -	$25.966	76.	- -	$169.812
71.	- -	$118.343	77.	- -	$0.60
72.	- -	$384.12	78.	- -	$3.719
73.	- -	$95.452	79.	-	$2.595
74.	- -	$2124.725	80.	- -	$12.85

81. For 2 years, 12 per cent. = .12.
For 3 years, 18 do. = .18.
For 4 years, 24 do. = .24.

82. For 6 months, 3 per cent. = .03
For 2 months, 1 do. = .01
For 4 months, 2 do. = .02
For 1 month, $\frac{1}{2}$ do. = .005
For 3 months, $1\frac{1}{2}$ do. = .015
For 5 months, $2\frac{1}{2}$ do. = .025
For 7 months, $3\frac{1}{2}$ do. = .035
For 8 months, 4 do. = .04
For 9 months, $4\frac{1}{2}$ do. = .045
For 10 months, 5 do. = .05
For 11 months, $5\frac{1}{2}$ do. = .055

83. For 13 months, $6\frac{1}{2}$ per cent. = .065
For 14 months, 7 do. = .07
For 17 months, $8\frac{1}{2}$ do. = .085

84. For 6 days, $\frac{1}{10}$ per cent. = .001
For 12 days, $\frac{2}{10}$ do. = .002
For 18 days, $\frac{3}{10}$ do. = .003
For 24 days, $\frac{4}{10}$ do. = .004
For 36 days, $\frac{6}{10}$ do. = .006
For 42 days, $\frac{7}{10}$ do. = .007
For 48 days, $\frac{8}{10}$ do. = .008
For 54 days, $\frac{9}{10}$ do. = .009

85.	- -	$0.472	91.	- -	$0.703
86.	- -	$0.544	92.	-	$0.426
87.	- -	$4.439	93		$0.197
88.	- -	$3.515	94.	- -	$0.832
89.	- -	$17.026	95.	-	$1.53
90.	- -	$4.273	96.	- -	$20.966

97. 6 months is 3 per cent. = .03. Then 1 month and 15 days are 45 days, which, divided by 6, gives .0075. The rate is .0375. Ans. $4.33.

98. $30.37

99. $13.93

100. $409.43

101. $1085.073
102. Interest $62.91 Due $596.91
103. $15.70
104. See book
105. 15s. = £0.75; 3d. 2 qrs. = 14 farthings; adding 1 because the number is greater than 12, it may be called £0.015. The whole is £13.765. The rate for 1 year and 6 months is .09

13.765
.09

Ans. £1.23885

The .2 = 4s. The rest of the fraction is nearly .039. Taking 2 from this, because the number is greater than 36, we have 37 farthings, which are 9d. 1 qr. Ans. £1 4s. 9¼d.

106. 4s. 4½d.
107. £34 7s. 11d.
108. £4 18s. 4d.
109. £1 5s. 4¼d.
110. 12s. 2d.
111. 2d.
112. £7 3s. 7¾d.
113. £42 11s. 3½d.

XXVIII.

Division of Decimals.

1.	-	-	$3.75	4.	-	-	1.5 bbl.
2.	-	-	$5.781	5.	-	-	1.406 bu.
3.	-	-	$36.715	6.	-	-	4.899 miles.

7.	£1 8s. 3¼d.	41.			$4.148
8.	£83 11s. 1d.	42.			9s. 1½d.
9.	6.172	43.			$2.50
10.	34.326	44.			$22.857
11.	.352	45.	37.825s. =		£1 17s.10d.
12.	2.871	46.	379.562s. =		£18 19s. 6¾d
13.	3.4617	47.			13.846 times
14.	28.903	48.			12 times
15.	1.4038	49.			37.895
16.	.4618	50.			297.771
17.	.09226	51.			2.567
18.	.02634	52.			10.204
19.	.00413	53.			3.627
20.	.0258	54.			10
21.	.03077	55.			100
22.	.00128	56.			61.538
23.	.00007	57.			44.156
24.	.0005765	58.			687.1345
25.	.0001006	59.			530000
26.	27 galls.	60.			254000
27.	70.6 bu.	61.			10
28.	Omitted in Book	62.			100
29.	18.18 lb.	63.			61.538
30.	166.7 lemons	64.			44.156
31.	21.7 coats	65.			687.1345
32.	17.7 acres	66.			530000
33.	10.56 acres	67.			254000
34.	15.41 hours	68.			19142.857
35.	43.333 days	69.			19142.857
36.	38.87 days	70.			35.862
37.	43.69 galls.	71.			2.802
38.	$2.80	72.			16.6113
39.	$6.667	73.			.8333
40.	$8.364	74.			.8333

75.	- -	.517	109.	- -	9.821 lb.
76.	- -	.517	110.	- -	$6.30
77.	- -	.46	111.	£6.484 =	£6 9s. 8¼d.
78.	- -	.46	112.	- -	17.918 bu.
79.	- -	.1905	113.	- -	6s. 8¾d.
80.	- -	.1905	114.	- -	£1 2s. 4d.
81.	- -	20	115.	- -	£29 1s. 2½d.
82.	- -	156.627	116.	- -	6.583
83.	- -	6320.896	116.	- -	42.173
84.	- -	124.031	117.	- -	352.46
85.	- -	408.163	118.	- -	754.26
86.	- -	177.211	119.	- -	1.28255
87.	- -	15700000	120.	- -	783.57
88.	- -	20.473 galls.	121.	- -	14.6934
89.	- -	2.43 galls.	122.	- -	.9957
90.	- -	5.324 galls.	123.	- -	28.308
91.	- -	14.942 bbls.	124.	- -	28.308
92.	- -	$6.765	125.	- -	99.314
93.	£0.781 =	15s. 7½d.	126.	- -	99.314
94.	- -	$6.355	127.	- -	.10837
95.	- -	$96.72	128.	- -	.003002
96.	- -	3.105 times	129.	- -	$\frac{1757}{1423}$
97.	- -	322.718	130.	- -	$\frac{3750}{5875}$
98.	- -	17.549	131.	-	$\frac{6375}{3268} = \frac{2125}{1756}$
99.	- -	22.321	132.	-	$\frac{3450}{2758} = \frac{1725}{1378}$
100.	- -	22.321	133.	- -	$\frac{16487}{233500}$
101.	- -	100	134.	$\frac{1134500}{214764} =$	$\frac{283625}{53691}$
102.	- -	100	135.	-	$\frac{7384}{3700} = \frac{1849}{925}$
103.	- -	5	136.	- -	$\frac{7}{500}$
104.	- -	5	137.	- -	$\frac{6473387}{4200}$
105.	- -	1	138.	- -	$\frac{53000}{67}$
106.	- -	1	139.	- -	$\frac{300}{1}$
107.	- -	12.27	140.	- - -	$\frac{35}{78}$
108.	- -	3.598	141.	- -	$\frac{1376}{1700} = \frac{688}{850}$

142. .- - $\frac{70387}{429500}$ 143. - - $\frac{1506400}{8944715}$

Miscellaneous Examples, page 101.

1. $70.269
2. $122.784
3. $8.192
4. $206.328
5. 1.417 cwt.
6. £43 11s. $1\frac{1}{2}$d.
7. 38.727 oz. $= 38\frac{8}{11}$ oz.
8. 10.383 ft.
9. 5.1 yds.
10. .00517 of a guinea = 13d.*
11. 43.976 days
12. 126.727 days
13. 272.875 sq. ft.; 8 sq. ft.; 34.11 yds.
14. 39.48 yds.
15. 3117.56 ft. $10.911
16. 860.2 ft.
17. 10.72556 bunches
18. 7.667 acres
19. $225.075
20. 3 cords
21. 2 ft. 8 in. = 3.666 + ft.

3.666 +
4

14.664 + (2

Ans. 7.33 ft. of wood.

* In this example, instead of .075 of a guinea, read .75 of a guinea.

In this I multiply the height and breadth together, and then, instead of multiplying by 8 and dividing by 16, I divide at first by 2.

22. 4.3 ft. of wood
23. 9.23 ft. of wood.
24. 1.39 cord, or 1 cord, 3.1 ft.
25. 4.45 ft. = 4 ft. 5.4 in.
26. 70848 bricks
27. £141 12s. 11½d.
28. $34.59
29. $33.734
30. £95 1s. 0¾d.
31. 6145.88(153647
    6145.88 ———
    ——— $0.04 on a dollar
    . . Ans. $939.027
32. The tax on $1 is $0.0339. Ans. $87.23
33. .274 = $27\frac{4}{10}$ per cent.
34. He gained $\frac{5}{20}$ of the first cost, which is .25 or 25 per cent.
35. .044 = $4\frac{4}{10}$ per cent.
36. .11 = 11 per cent.
37. 1s. 8d. = 20d. 2s. 3d. = 27d. He gained 7d. which is $\frac{7}{20}$ of the first cost. $\frac{7}{20}$ = .35 or 35 per cent.
38. .137 = $13\frac{7}{10}$ per cent.
39. $15\frac{3}{10}$ per cent.
40. $18\frac{6}{10}$ per cent.
41. He can pay $\frac{13}{19}\frac{47}{13}\frac{82}{74}\frac{19}{43}$ of the whole debt. This reduced to a decimal is .704 — Ans. $70\frac{4}{10}$ per cent. nearly
42. The whole discount was $11.40, which is $\frac{114}{570}$ = .2 Ans. 20 per cent.
43. The whole interest was $5.22, which is $\frac{522}{8700}$ of the

principal. This reduced to a decimal is .06. Ans. 6 per. cent.

44. He paid $12.81 for 2 years, which is $6.405 for 1 year. $\frac{6}{1}\frac{4}{8}\frac{0}{3}\frac{5}{0}\frac{}{0}\frac{}{0} = .035$. Ans. $3\frac{1}{2}$ per cent.

45. Find how much he paid for 1 year, and then find the rate as above. Ans. $6\frac{1}{2}$ per cent. nearly

46. $.0452 = 4\frac{5}{1}\frac{2}{0}\frac{}{0}$ per cent.

47. Since 4s. 6d. is equal to 9 sixpences, and £1 is equal to 40 sixpences

$$40(9$$

Ans. $4.444 +

48. Reduce the £35 to sixpences and divide by 9; or multiply $4.444 + by 35. If there are shillings and pence, they must be reduced to decimals. Ans. $155.555

49. £27 14s. 8d. = £27.733 or £27.733

4.444	40
110932	11.09320(9
110932	
110932	$123.258
110932	
$123.245452	

The latter method is shorter and more exact.

50. $834.964 +

51. Multiply by 9 to reduce it to English sixpences, and then divide by 40, the number of sixpences in £1; or divide $19.42 by $4.444. Ans. £4.369 = £4 7s. $4\frac{1}{2}$d.

52. £35.325 = £35 6s. 6d.

53. £536 11s. 3d.

54. Cost $680.30 Sold $761.94

55.	-	-	$5.386 +	65.	-	-	$0.00291
56.	-	-	$5.80	66.	-	-	$0.0006
57.	-	-	$12.848	67.	-	-	$0.002177 +
58.	-	-	$6.517	68.	-	-	$0.06372
59.	-	-	$16.34	69.	-	-	7s. 6½d.
60.	-	-	£11 8s. 11¼d.	70.	-	-	3¼d.
61.	-	-	£19 5s.	71.	-	-	6s. 6¾d.
62.	-	-	£2 15s. 1d.	72.	-	-	5s. 10½d.
63.	-	-	£21 18s. 1¾d.	73.	-	-	$564.04
64.	-	-	$127.133 +	74.	-	-	$1132.90

In examples like the two last, some compute the interest on the whole sum to the time of the first payment and add it to the principal, and then deduct the payment; then they compute the interest on the remainder to the time of the second payment, and add it to the principal, and deduct the payment again; and so on. This is not a just method, if simple interest only is allowed, for if the payments were made annually, it would be compound interest; and if they were made oftener, it would be more than compound interest.

Answers to the examples in Circulating Decimals, page 209 *and* 210.

.555 &c. $= \frac{5}{9}$
.666 &c. $= \frac{6}{9} = \frac{3}{3}$
.777 &c. $= \frac{7}{9}$
.888 &c. $= \frac{8}{9}$
.999 &c. $= \frac{9}{9} = 1$
.533 &c. $= \frac{5}{10} + \frac{3}{90} = \frac{48}{90} = \frac{8}{15}$
.466 &c. $= \frac{4}{10} + \frac{2}{30} = \frac{14}{30} = \frac{7}{15}$
.388 &c. $= \frac{7}{18}$
.3744 &c. $= \frac{37}{100} + \frac{4}{900} = \frac{337}{900}$

$.46355\ \&c. = \frac{463}{1000} + \frac{5}{9000} = \frac{1043}{2250}$

$.\dot{2}\dot{4} = \frac{24}{99} = \frac{8}{33}$

$.4\dot{2} = \frac{42}{99} = \frac{14}{33}$

$.53\dot{7} = \frac{5}{10} + \frac{37}{990} = \frac{266}{495}$

$.474\dot{5} = \frac{47}{100} + \frac{45}{9900} = \frac{4698}{9900} = \frac{783}{1650}$

$.8374\dot{4} = \frac{8374}{9999}$

$.47647\dot{7} = \frac{47}{100} + \frac{647}{99900} = \frac{476}{999}$

Miscellaneous Examples, page 211.

1.	-	-	1s. 4d.	5.	-	-	3s. 2d.
2.	-	-	4s. 3d.	6.	-	-	£1 12s.
3.	-	-	11d.	7.	-	-	15s. 2d.
4.	-	-	3s. 2d.	8.	-	-	17s. 10d.

9. 4s. 5d.
10. £1 6s. 1d.
11. £2 9s. $9\frac{4}{7}$d.
12. £2 12s. $3\frac{6}{5}$d.
13. 2 cwt. 1 qr. 21 lb.
14. £2 13s. $8\frac{1}{3}$d.
15. 2 cwt. 3 qrs. $24\frac{1}{3}$ lb.
16. 2 cwt. 1 qr. $9\frac{4}{7}$ lb.
17. 46 galls. $1\frac{1}{3}$ qt.
18. { 1 coat 1 yd. 3 qrs. $1\frac{3}{7}$nl. / 13 coats 23 yds. 3qrs. $2\frac{4}{7}$ nls.
19. £65 3s. 4d.
20. £17 1s. $1\frac{1}{5}$d.
21. In this example, I first multiply by $54 = 6 \times 9$, and then subtract $\frac{1}{5}$ of £56 9s. 7d. from the product. I then divide the whole by $18 = 3 \times 6$

£	s.	d.	
56	13	8	
		9	
510	3	0	
		6	
3060	18	0	
—11	6	$8\frac{4}{5}$	$= \frac{1}{5}$ of £56, &c.
3049	11	$3\frac{1}{5}$	(6
508	5	$2\frac{16}{30}$	(3

£169 8s. $4\frac{14}{30}$d. Ans.

22. £1650 18s. 5d.
23. £5 8s. $0\frac{8}{21}$d.
24. £3 0s. $2\frac{10}{13}$d.
25. £39 11s. $2\frac{32}{42}\frac{8}{55}$d.
26. $103\frac{4}{5}$ ft.
27. 17h. 12 min.
28. $11\frac{1}{3}$ days.
29. They meet on the next day after their departure at 9h. $50\frac{10}{33}$ min. morn. The distance from Boston $127\frac{37}{69}$ miles, and from New York $122\frac{32}{69}$ miles.
30. A $17\frac{11}{12}$. B $14\frac{11}{12}$
31. $11\frac{1}{7}$ oz.
32. 390 men
33. 10 days
34. $15\frac{2}{13}$ oz.
35. $4\frac{1}{2}$ yds.
36. $9\frac{1}{11}$ months
37. $4166\frac{2}{3}$ yds. of shalloon
38. $202\frac{11}{32}$ quarters.

39. 20 men

40. If 7 men can build 36 rods in 3 days, they can build 12 rods in 1 day, and 168 rods in 14 days. If 7 men can build 168 rods, 20 men can build 480 rods in the same time. Ans. 480 rods.

41. $19\frac{5}{9}$ bushels

42. $125.917+

43. In questions like this and some of the preceding, where there are several conditions, it is necessary to take one condition at a time, and solve the question with regard to each separately.

If 18 men can build a piece of wall in 15 days, how many days will it take 20 men to build the same wall? It would take them $13\frac{1}{2}$ days.—If 20 men can build 40 rods of wall in $13\frac{1}{2}$ days, how long will it take them to build 87 rods of the same kind? It would take them $29\frac{2}{8}\frac{9}{0}$ days.—If 20 men can build 87 rods of wall 5 feet high in $29\frac{2}{8}\frac{9}{0}$ days, how long will it take them to build the same number of rods 8ft. high? It would take them $46\frac{4}{5}\frac{9}{0}$ days.—If 20 men can build a wall 4 feet thick in $46\frac{4}{5}\frac{9}{0}$ days, how many days will it take to build one 5 ft. thick? It will take them $58\frac{2}{4}\frac{9}{0}$ days.

It is, however, less trouble to represent the several conditions as follows:

The first condition is with regard to the number of men. 20 men will do it in $\frac{1}{2}\frac{8}{0}$ of the time that 18 men would do it. This may be represented thus, $\frac{15 \times 18}{20}$. It would take $\frac{8}{4}\frac{7}{0}$ as long on account of the length; this is expressed thus, $\frac{15 \times 18 \times 87}{20 \times 40}$. It would take $\frac{8}{5}$ as long, on account of the height. This is expressed thus, $\frac{15 \times 18 \times 87 \times 8}{20 \times 40 \times 5}$. It

would take $\frac{4}{4}$ as long, on account of the thickness. This is expressed thus, $\frac{15 \times 18 \times 87 \times 8 \times 5}{20 \times 40 \times 5 \times 4}$

This may be reduced before the operation is performed; the 15 in the numerator and 20 in the denominator are divisible by 5; 18 and 4 are divisible by 2; 5 and 5 are divisible by 5; 8 and 40 are divisible by 8. Performing these divisions, the fraction becomes $\frac{3 \times 9 \times 87 \times 1 \times 1}{4 \times 5 \times 1 \times 2}$.

Multiplying the numbers, the numerator becomes 2349, and the denominator 40, and the fraction stands thus $^{2}\frac{3}{4}\frac{4}{0}^{9} = 58\frac{29}{40}$ as before. Ans. $58\frac{29}{40}$ days.

44. $948.88\frac{8}{9}$
45. 2808 quarters
46. 168 tailors
47. 60 measures
48. 432 tiles
49. 160632 bricks
50. 14400 shingles
51. 994 ft.
52. $51.10\frac{1}{9}$
53. $0.505 —
54. $13.09
55. $23.83
56. The gain was $10.49. It is nearly $2\frac{4}{10}$ per cent. on $437.45
57. $29.99
58. See book.

59.

yrs.	5 rates	6	yrs.	5 rates	6
1	1.05000	1.06000	11	1.71034	1.89830
2	1.10250	1.12360	12	1.79585	2.01220
3	1.15762	1.19102	13	1.88565	2.13293
4	1.21551	1.26248	14	1.97993	2.26090
5	1.27628	1.33822	15	2.07893	2.39656
6	1.34009	1.41852	16	2.18287	2.54035
7	1.40710	1.50363	17	2.29202	2.69277
8	1.47745	1.59385	18	2.40662	2.85434
9	1.55132	1.68948	19	2.52695	3.02560
10	1.62889	1.79085	20	2.65329	3.20713

60. $2.322

61. $94.35

62. $1179.915

63. 1135.88

64. $1753 +. The principal is doubled in 11 years, 10 months, and between 21 and 22 days.

65. To answer this question, the best way is to find the amount of the whole sum for the whole time, and then to find what each of the payments would amount to from the time they were made, until the 8th of July, 1822; and deduct them from the whole amount. Ans. $846.247.

66. The amount of £1 for 5 years, at six per cent. according to the table, is £1.33822; computing the interest on this for 3 months, and adding it, it amounts to £1.35829. £17 13s. 6d. = £17.675.

$$1.35829 \times 17.675 = 24.008 —$$

Ans. £24 0s. 2d.

67. - - $282.875
68. - £229 9s. 6d.
69. - - $0.47
70. - - 0.094\frac{2}{4}$
71. - - 1.484\frac{3}{13}$
72. - - 0.75\frac{6}{13}$
73. - - $53\frac{3}{4}$ galls.
74. - - $19\frac{5}{13}$ galls.
75. - - See book
76. - - See book
77. See book

78. 10 galls. of the cheaper to 25 of the dearer; or 2 of the cheaper to 5 of the dearer

79. 5 lb. at 10 cents, 2 lb. at 13 cents, and 2 lb. at 16 cents

80. 2 parts water to 13 of rum

81. 6 " at 9s., 1 at 7s., 1 at 5s., and 3 of water
Or 1 part at 9s., 6 at 7s., 3 at 5s., and 1 of water
Or 6 parts at 9s., 6 at 7s., 3 at 5s., and 4 of water
Or 6 " at 9s., 7 at 7s., 1 at 5s., and 4 of water

82. See book

83. 20 bu. of barley, and $61\frac{9}{11}$ of oats

84. $32\frac{1}{4}$ galls.

85. A's loss $80\frac{140}{467}$ tons
B's loss $54\frac{280}{467}$ tons
C's loss $15\frac{45}{467}$ tons

86. These fractions reduced to a common denominator are $\frac{300}{600}$, $\frac{200}{600}$, $\frac{150}{600}$, and $\frac{132}{600}$. Rejecting the denominators, the numerators show the proportions. The sum of the numerators is 77.

The wife's share is $\frac{300}{777}$ of the whole sum = 4675.32\frac{324}{777}$
The eldest son's share $\frac{200}{777}$ = 3116.88\frac{24}{777}$
The second son's " $\frac{150}{777}$ = 2337.66$\frac{18}{777}$
The daughter's " $\frac{132}{777}$ = 1870.12$\frac{76}{777}$

In this example much labour may be saved after finding the wife's share, by observing that the eldest son's share is $\frac{2}{3}$ of the wife's share, the second son's $\frac{1}{2}$ of it, and the daughter's $\frac{2}{5}$ of it.

87. A should pay \$16.44$\frac{4}{9}$
B " \$20.55$\frac{5}{9}$

88. A's share \$116.66$\frac{2}{3}$
B's " \$133.33$\frac{1}{3}$

89. A 1 guinea, 15s. 6$\frac{54}{1047}$d.
B 2 guineas, 8s. 6$\frac{558}{1047}$d.
C 5 guineas, 5s. 3$\frac{819}{1047}$d.
D 10 guineas, 12s. 7$\frac{663}{1047}$d.

90.* One of the 1st class should pay \$39.09
2d " 12.167
3d " 8.046
4th " 4.841
5th " 2.219

91. To find A's proportion,

£150 × 7 = 1050
£100 × 5 = 500
£270 × 6 = 1620

3170 = A's proportion

In the same manner find the proportions of B and C.

A = 3170
B = 3770
C = 8560

15500

They must share the gain as follows:

A $\frac{3170}{15500}$ of it = £92 0s. 7$\frac{3}{4}$d.
B $\frac{3770}{15500}$ " = £109 9s. 0$\frac{1}{4}$d.
C $\frac{8560}{15500}$ " = £248 10s. 4d.

92. *Rule for Compound Fellowship.* Multiply each man's stock by the time it is employed; each of these pro-

* This answer is what each should pay for the whole time. First find the price of 14 weeks, and divide between the 10; then of 3 weeks and divide by 14, &c.

ducts being made the numerator of a fraction, of which their sum is the denominator, will express each man's proportion of the stock to be divided.

93. - - 15 months
94. - - 24 months
95. - - 120 months
96. - 1738 months
97. - - 8 months
98. - - $5\frac{17}{28}$ months
99. - - 16 months
100. - - 3 months
101. - - $7\frac{14}{23}$ months
102. - - $38\frac{11}{20}$ months
103. - $5\frac{1}{12}$ months
104. - - 8 months
105. - - 6 months
106. - - 8 months
107. - $4\frac{1}{3}$ months
108. - - $723.488
109. - - $691.542
110. - $151.06
111. - $11.276
112. - $79.064

113. $560.173

114. A's $15. B's $35

115. Son's share $5468.75
Wife's " 7031.25

116. 3 h. 45 min. morn.

117. 45 and 50

118. $2\frac{2}{3}$ days

119. $1\frac{7}{8}$ day

120. The first could build $\frac{1}{8}$ of it in a day, the second $\frac{1}{10}$, and the third $\frac{1}{12}$ of it. They would altogether do $\frac{37}{120}$ of it in a day; and it would take them $3\frac{9}{37}$ days to do the whole. Ans. $3\frac{9}{37}$ days

121. They both together consumed $\frac{1}{15}$ of it in a day; the woman alone consumed $\frac{1}{21}$ in a day; the man alone consumed the difference between $\frac{1}{15}$ and $\frac{1}{21}$, which is $\frac{4}{105}$. It would last the man alone $83\frac{3}{4}$ days

122. $1\frac{37}{41}$ week

123. 1 h. 59 min. $37\frac{17}{19}$ sec.

124. 9 and 16

125. The elder had $8750
The younger $6250

126. Wife's share $18833.33⅓
Son's " $17333.33⅓
Daughter's $13833.33⅓

127. Take out $500, and then A's share will be equal to B's: add $300, and C's share will be equal to B. Divide this into three equal parts, and one of the parts will be equal to B's share. Having B's share, it will be easy to find the others

A's share $12100
B's " 11600
C's " 11300

128. Sheep $8
Cow $18
Ox $36

129. 12 calves
6 sheep

130. 7 oxen, 14 cows, 42 sheep

131. Rye 5s.; wheat 8s. per bushel

132. The tallow and hide came to $7.99; this subtracted from $50 leaves $42.01 for the value of the meat. The hind quarters together weighed 440 lb.; at ½ a cent per lb. they would come to $2.20. This subtracted from 42.01 leaves $39.81. If this be divided by 873, the weight of all the quarters, it gives $0.0456 nearly, which is the price per lb. of the fore quarters. The hind quarters are ½ cent per lb. more, which is $0.0506

Price of A's quarter $10.9802
" B's " 11.2838
" C's " 9.7584
" D's " 9.9864

133. A's quarter at 6½ cents per lb. comes to $14.105; B's to $14.495; C's, at 6 cents, comes to $12.84; D's to $13.14. The sum of these is $54.58. A must pay $\frac{14}{54}\frac{1}{58}\frac{0}{58}$

of $42.01; B $\frac{144}{1715}$; C $\frac{1224}{4900}$; D $\frac{1}{245}$. A's share is $10.857; B's $11.156; C's $9.883; and D's $10.114.

134. The horse is worth 9 parts, and the saddle 1 part of $150. That is, the horse is worth $\frac{9}{10}$, and the saddle $\frac{1}{10}$ of it. Ans. Horse $135, the saddle $15

135. There are 9 cattle to 20 sheep. $\frac{9}{29}$ of the whole are cattle, and $\frac{20}{29}$ sheep. Ans. 54 cattle, and 120 sheep

136. To 1 ox, there were 3 cows and 6 sheep. $\frac{1}{10}$ of them were oxen, $\frac{3}{10}$ cows, and $\frac{6}{10}$ sheep. Ans. 8 oxen, 24 cows, 48 sheep

137. Say the fourth has 2 parts, the third 3 parts, the second 5 parts, and the first 10 parts; then the fourth will have $\frac{2}{20}$ of the whole, the third $\frac{3}{20}$, the second $\frac{5}{20}$, and the first $\frac{10}{20}$. Ans. The share of the first is $6500; of the second $3250; of the third $1950; and of the fourth $1300

138. Since B is to have 15 crowns more than A, take out 15 for B, and they have equal shares in the remainder. C is to have $\frac{1}{3}$ of both their sums added together, that is, $\frac{1}{3}$ of twice the share of A, and $\frac{1}{3}$ of 15 besides. Take out $\frac{1}{3}$ of 15, which is 3, and then he is to have of the remainder $\frac{1}{3}$ of what A and B have of it. 15 and 3, which is 18, taken from 324 leave 306; of this say A and B together are to have 5 parts and C 1 part; that is, A and B together are to have $\frac{5}{6}$ and C $\frac{1}{6}$ of 306 crowns. $\frac{1}{6}$ of 306 is 51, and $\frac{5}{6}$ is 255. $\frac{1}{2}$ of 255 is $127\frac{1}{2}$; this is A's share; 15 added to this makes $142\frac{1}{2}$; this is B's share. 3 added to 51 makes 54; this is C's share. Ans. A took $127\frac{1}{2}$ crowns, B $142\frac{1}{2}$, and C 54

139. Each person owns $\frac{4}{32}$ of the whole. A sold $\frac{3}{32}$ and had $\frac{1}{32}$ left. B sells 2 of his shares, which are divided equally among the other shares; there are now only 30 shares, and they are equal as before; therefore A owns $\frac{1}{30}$ of the whole

140. C took $\frac{18}{64}$, that is, $\frac{9}{32}$ of the whole gain; therefore he must have put in $\frac{9}{32}$ of the whole stock, and A and B to-

gether $\frac{11}{12}$. A and B together put in $115; this is $\frac{11}{12}$ of $160; which is the whole stock; of this C put in $45

141. See book

142. 1 cord, 1 ft. 1′ 8″

143. 306 ft. 11′ 4″

144. 2 cords, 5 ft. 7′ 5″

145. $1.203125

146. See book

147. $\frac{4}{5} = \frac{8}{12}$, and $\frac{3}{4} = \frac{9}{12}$; their ages are to each other in the proportion of 8 and 9; that is, the age of the younger is $\frac{8}{9}$ of the age of the elder; therefore 10 must be $\frac{1}{9}$ of the age of the elder. Ans. Younger 80, and the elder 90 years.

148. Observe that the third had $\frac{1}{2}$ as much as the first. The second had as much as the third and fourth, that is, $\frac{1}{2}$ as much as the first, and 5 cents; the first had as much as the second and fourth, that is, $\frac{1}{2}$ of the first, and 5 cents, and 5 cents again; or $\frac{1}{2}$ of itself and 10 cents. Therefore 10 cents is $\frac{1}{2}$ of the first. Ans. The first had 20 cents, the second 15, the third 10, and the fourth 5

149. $\frac{1}{6}$ of A's and $\frac{1}{4}$ of B's are equal to 13; multiplying by 4, $\frac{4}{6} = \frac{2}{3}$ of A's and once B's are equal to 52. Again, $\frac{1}{8}$ of A's and $\frac{1}{2}$ of B's are equal to 16; multiplying by 2, $\frac{2}{8} = \frac{1}{4}$ of A's and once B's are equal to 32. 20 then is the difference between $\frac{1}{4}$ and $\frac{2}{3}$ of A's age. The difference between $\frac{1}{4}$ and $\frac{2}{3}$ is $\frac{5}{12}$. 20 is $\frac{5}{12}$ of 48, the age of A. $\frac{1}{6}$ of 48 is 8. 8 and 5 are 13; therefore 5 is $\frac{1}{4}$ of B's age. Ans. A's age 48 years; B's 20

150. Both together were $400; $\frac{1}{4}$ of the first, and $\frac{1}{3}$ of the second were $120; multiplying by 3, $\frac{3}{4}$ of the first and once the second together were equal to $360; taking this from $400, there remains 40 for $\frac{1}{4}$ of the first. Ans. First $160, and the second $240

151. The whole of the money of the second, and $\frac{1}{5}$ of that of the first is $4200; multiply the first condition by 3,

the whole of the money of the second, and three times that of the first is $12600; taking $4200 from this, there remains $8400; this is the difference between $\frac{1}{5}$ of the first and three times the first; that is, $\frac{14}{5}$ of the first. $8400 is $\frac{14}{5}$ of $3000, which is the money of the first. Ans. The first had $3000, and the second $3600

152. He bought 4 at 2 cents each, as often as he bought 3 at 3 cents each. 4 at 2 cents came to 8 cents, and 3 at 3 cents came to 9 cents; therefore every 7 lemons cost 17 cents, which is $2\frac{3}{7}$ cents each. He sold them at $2\frac{1}{2}$ cents each. The difference between $2\frac{3}{7}$ and $2\frac{1}{2}$ is $\frac{1}{14}$. He gained $\frac{1}{14}$ of a cent on each lemon, that is 1 cent on 14 lemons. To gain 25 cents, he must have had 25 times 14 lemons. $\frac{4}{7}$ of them cost 2 cents, and $\frac{3}{7}$ cost 3 cents each. Ans. 350 lemons

153. $8\frac{4}{7}$ barrels

154. He received five times as much as he spent, and then he had 200 dollars; if he had received as much as he spent, he would have had as much as he had at first, viz. $100. The other $100 then must be four times what he spent. Ans. $25

155. Each son had $\frac{5}{22}$ of the whole estate, and each daughter $\frac{4}{22}$ of it. The two sons together had $\frac{10}{22}$, and the three daughters $\frac{12}{22}$; the difference is $\frac{2}{22}$. $1000 therefore is $\frac{2}{22}$, and $500 is $\frac{1}{22}$ of the whole estate. Ans. The share of a son was $2500

156. Take $\frac{1}{3}$ of the whole for the wife, and $\frac{1}{3}$ for the son. Then, of the other $\frac{1}{3}$, the daughter has 3 parts, and the wife 1 part, that is, the daughter has $\frac{3}{4}$ of $\frac{1}{3} = \frac{3}{12}$ of the whole. The son had $\frac{4}{12}$. The difference is $\frac{1}{12}$. Therefore $1000 is $\frac{1}{12}$ of the whole. Ans. The wife had $5000; the son $4000; and the daughter $3000

157. If he had bought 3 less for the same money, the price of each orange would have been once and one half as

much; consequently, if he had bought the same number at the latter price, they would have come to $37\frac{1}{2}$ cents. Three oranges then would have come to $12\frac{1}{2}$ cents. Hence 3 oranges must have been $\frac{1}{3}$ of the number that he bought. Ans. He bought 9 oranges, at $2\frac{7}{9}$ cents each

158. Say the first had 6 parts, the second 4 parts, and the third 3 parts. The first had $\frac{6}{13}$, the second $\frac{4}{13}$, and the third $\frac{3}{13}$. The second and third together had $\frac{7}{13}$ of the whole. $1500 is $\frac{7}{13}$ of the whole, which is 2785.71\frac{3}{7}$. Ans. The first had 1285.71\frac{3}{7}$, the second 857.14\frac{2}{7}$; and the third 642.85\frac{5}{7}$

159. Double the second condition, and say, he had 16 bushels of corn and 20 of rye for $30; and 48 bushels of corn and 20 of rye for $54. The difference between $30 and $54 (which is $24) must be the price of 32 bushels of corn, which is $0.75 per bushel. Ans. Corn $0.75, and rye $0.90 per bushel

160. He had travelled 42 parts of the distance, and had 25 parts to travel; that is, he had travelled $42\frac{2}{7}$ of the distance, which is 210 miles. Ans. 30 miles per day

161. The second had as much as the first, and $\frac{1}{3}$ as much as the third. Taking the last conditions, the second had 1 part, while the third had 3 parts. The third had as much as the other two; the first part of the second balances one part of the third; then of the other 2 parts, one will balance what the first had, and the other the part which the second had, that was equal to the first. Therefore the first had 1 part, the second 2 parts, and third 3 parts; that is, $\frac{1}{6}$, $\frac{2}{6}$, and $\frac{3}{6}$. $2000 is $\frac{1}{6}$ of the whole. Ans. The second had $4000, and the third $6000

162. When they were married, her age was 1 to his 3; after 15 years, hers is 2 to his 4. It appears that her age was doubled, and his had become $\frac{4}{3}$ of what it was. Hence

her age was 15, and his was 3 times 15 or 45 years when they were married. Ans. Man 45, and wife 15 years

163. $1.35 per gall.

164. A had gained a sum equal to $\frac{1}{4}$ of his stock; he had then $\frac{5}{4}$ of it. B had only $\frac{1}{2}$ as much, that is $\frac{5}{8}$ of his stock, consequently $225, which he had lost, was $\frac{3}{8}$ of his stock. Ans. $600 each

165. If to $\frac{1}{2}$ the body, 16 inches be added, it makes the length of the tail; if to this 16 inches more be added, it makes the body, that is, $\frac{1}{2}$ the body and 32 inches make the whole body. The body then is 64 inches, and the whole 128 inches. Ans. 128 inches

166. If to $\frac{2}{7}$ of the age of C 20 be added, it makes the age of B; if to this 20 be added again, it makes the age of C; that is, 40 and $\frac{2}{7}$ of itself makes the age of C; 40 then is the other $\frac{5}{7}$. 40 is $\frac{5}{7}$ of 56. Ans. B 36, and C 56 years.

167. If the second be covered, it will weigh three times the first, that is 36 oz. The cover and the second cup together therefore weigh 36 oz. If the first cup be covered, it will weigh twice as much as the second; therefore if both the cups and the cover be taken together, the first cup and the cover will be $\frac{2}{3}$, and the second $\frac{1}{3}$ of it. The whole together weigh 48 oz.; $\frac{1}{3}$ of this is 16 oz.; this is the weight of the second cup, consequently the cover must weigh 20 oz. Ans. Cover 20 oz. and second cup 16 oz.

168. The first and second do $\frac{7}{9}$ of it, consequently the third does the other $\frac{2}{9}$ of it. The second and third do $\frac{7}{11}$ of it, consequently the first does $\frac{4}{11}$. $\frac{4}{11}$ and $\frac{2}{9}$ are $\frac{58}{99}$. The first and third together do $\frac{48}{99}$ of it, consequently the second does the other $\frac{41}{99}$. Ans. $\frac{41}{99}$

169. The apples cost $\frac{5}{12}$ of a cent each. There were 8 apples to 5 pears. 8 apples cost $\frac{40}{12} = \frac{10}{3}$ cents, and 5 pears cost the same; therefore 8 apples and 5 pears cost $\frac{20}{3}$ of a cent, which will average $\frac{20}{39}$ of a cent apiece. He gained $\frac{19}{39}$

on each, consequently he gained 19 cents on 39. $\frac{8}{13}$ of these were apples, which is 24; this is half what he bought. Ans. He bought 48, and gave 20 cents for them

170. In going once round the dial plate, the minute hand gains 55 minutes or spaces; consequently it would take it $\frac{60}{55} = 1\frac{1}{11}$ minute to gain 1 minute or space, and to gain 35 it would take 35 times as long, that is, $38\frac{2}{11}$ min. Ans. 7 h. $38\frac{2}{11}$ min.

171. This is to divide 12 into 2 parts, in the proportion of 5 and 17. The first part will be $\frac{5}{22}$ of 12. Ans. 2 h. 43 min. $38\frac{3}{11}$ sec.

172. Reducing the fractions to a common denominator $\frac{21}{63}$ of the time past is equal to $\frac{14}{63}$ of the time to come, or the time past equal to $\frac{14}{21}$ of the time to come. $\frac{14}{41}$ of 12 hours will be the time. Ans. 4h. 5 min. 51 $\frac{9}{41}$ sec.

173. He sold $\frac{1}{4}$ of his linen and $\frac{1}{5}$ of his cotton for $12, by which he gained $0.60. Hence this quantity cost him $11.40. Multiplying this condition by 4, all his linen and $\frac{4}{5}$ of his cotton must have cost him $45.60. Subtracting this from $50, the price of the whole, there remains $4.40 for the price of $\frac{1}{5}$ of the cotton. The cotton cost $22; consequently the linen cost $28; 5 times 22 are 110, the number of yards of the cotton; 3 times 28 are 84, the number of yards of linen. Ans. 110 yds. of cotton, and 84 yds. of linen.

174. A's share is $\frac{8}{9}$ of B's, and C's share is $\frac{4}{7}$ of B's. The difference between $\frac{8}{9}$ and $\frac{4}{7}$ is $\frac{36}{63}$, therefore the difference between the shares of A and C is $\frac{36}{63}$ of B's share; hence $7500 is $\frac{36}{63}$ of B's share.

Ans. A's share is 11666\frac{2}{3}$, B's 7291\frac{1}{3}$ and C's 4166\frac{2}{3}$

175. Beginning at the end of the 3d year, subtract $150 from 14811\frac{7}{18}$, and the remainder 14661\frac{7}{18}$ is $\frac{5}{6}$ of what it was at the beginning of the year, that is, 11729\frac{1}{2}$. From this subtract $150 again, and the remainder will be of what it was at the beginning of the first year; that is

$9263\frac{1}{4}\frac{3}{3}$. From this subtract $150, and the remainder is $\frac{5}{4}$ of his first stock. Ans. 7290\frac{1}{2}\frac{4}{5}\frac{1}{3}$

176. While the grey-hound takes 3 leaps the hare takes 4, therefore while the grey-hound takes 1 leap the hare takes $1\frac{1}{3}$, and while the grey-hound takes 2 leaps the hare will take $2\frac{2}{3}$ leaps; but the grey-hound leaps as far at 2 leaps as the hare does at 3, therefore in taking 2 leaps he gains $\frac{1}{3}$ of one of of the hare's leaps, that is, $\frac{1}{6}$ at each leap; hence he will overtake her at 6 times 50 or 300 leaps. Ans. 300 leaps

177. If he had worked the whole time, he would have received $90, but he lost $15 out of this. Now the difference between working and being idle was $2 a day. Hence he was idle $7\frac{1}{2}$ days. Ans. $52\frac{1}{2}$ days

178. In 8 years he gets £40 in debt, that is, £5 a year; therefore he spends £5 more than his income. A spends $\frac{4}{5}$ of his, and B spends £5 more than $\frac{5}{5}$. Hence £25 must be $\frac{1}{5}$ of his income. Ans. £125

179. Spouting from his throat he would fill at the rate of $\frac{1}{6}$ of the cistern in an hour, from his right eye he would fill $\frac{1}{48}$ of it in an hour, from his left eye he would fill $\frac{1}{72}$ of it in an hour, from his right foot he would fill $\frac{1}{4}$ of it in an hour. All these together make $\frac{65}{144}$; hence, all spouting together, he would fill $\frac{65}{144}$ of it in an hour; 65 is contained in 144 $2\frac{14}{65}$ times. Ans. 2 h. 12 min. $55\frac{5}{13}$ sec.

180. After the fourth game, twice his money was as much less than 200s. as three times his money was greater than 200s.; hence 200s. was $2\frac{1}{2}$ or $\frac{5}{2}$ his money. 200 is $\frac{5}{2}$ of 80, to that add 20, and it will make what he had at the end of the third game. $80 + 20 = 100$; $\frac{1}{2}$ of 100 or 50 is what he had after the second game. $50 + 10 = 60$ is what he had after the first game, and $\frac{1}{2}$ of 60 or 30 is what he commenced with. Ans. 30s.

181. 15.708ft.

182. 5.41ft.

183—187. See book
188. 24855.412 miles
189. 1035.6 miles
190. 69.043 miles
191. 15 degrees
192. 15 min. of a degree
193. 1 h. 34 min. 52 sec.
194. 4 h. 27 min. 16 sec.
195. 0 h. 36 min. 28 sec. even.
196. 68093 miles nearly
197. 1433.8 miles. Lat. of Boston 42° 23′
198. 2487.45 miles
199. $61.035
200. £34 12s.
201. $160.03
202. 1532 francs, 90$\frac{1}{2}$ centimes
203. $209.20
204. 246 $\frac{12}{16}$ gelders.
205. $301

THE END.

HILLIARD, GRAY, & Co's CATALOGUE OF IMPROVED

School Books.

HILLIARD, GRAY, & CO.

BOSTON,

ARE EXTENSIVELY ENGAGED IN PUBLISHING A GREAT VARIETY OF

THE MOST VALUABLE

ELEMENTARY BOOKS.

☞ It is their aim to publish only such as possess superior merits; and that every work shall be well printed on good paper, and well bound. Several of the School Books, which they have heretofore published, have been revised and re-modelled, and are now presented to the public in an improved form. They have also an Extensive Assortment of Valuable Works in all the Departments of Literature and Science. They solicit the patronage of the Public, and invite Instructers and Literary Gentlemen to examine these Books.

The following are among those which they have recently published.

Cummings' Ancient and Modern Geography, Improved.

Price of Geography, 62½ cts.
Do. Atlas, 75 cts.

The very liberal patronage which has been given to this work in its original form, has imposed on the proprietors an obligation to improve it as much as possible. It is confidently believed that the public will be satisfied that this obligation has been faithfully fulfilled in the present edition. The work is considerably reduced in size, by excluding such tables and abstract statements as are uninteresting and unimportant in an elementary treatise; but it contains more than the preceding editions of such matter as is useful to children.

In Cummings' Geography Improved, the questions are placed at the end of the several chapters. This is more convenient for the scholar than the former arrangement. Instead of adding a pronouncing vocabulary at the end of the book, most of the difficult names have their true pronunciation given where they occur; this will be found a very valuable improvement, and it is peculiar to this Geography.

A great number of cuts, very neatly engraved, ornament the work, and tend to illustrate the subjects, and render them interesting.

The simplicity of style and interesting manner of description, by which this work is characterized, have enabled it to sustain a high rank, and secur-

ed it a very extensive circulation. It is not to be forgotten that the public are indebted to Mr. Cummings for the general system of instruction in this science which now prevails, and which has been found so useful. The editor of the present edition has endeavored to retain the peculiar excellences of the original work; to correct its errors; and to make such improvements as will render it worthy of a still more extensive patronage. A great part of the work has been newly written, and it is interspersed with such instructions to scholars and teachers, as will facilitate the study of it, and render it permanently useful.

The ATLAS for the Improved Edition is newly engraved, contains a chart showing the comparative height of the principal Mountains, and of the comparative length of the principal Rivers in the world, and is intended to be as perfect as a work of the kind can be made.

Cummings' Pronouncing Spelling Book.

Price 25 cents.

THE extensive sale of this work, and the numerous testimonies of instructers and literary gentlemen, are sufficient proof of the excellence of its plan and execution. Indeed, those who consider the importance of teaching their children the correct pronunciation of the English language, while they are learning to read it, cannot but highly appreciate the plan of this Spelling Book. How frequently do we find that the errors in pronunciation, into which persons are allowed to fall in their childhood, continue to be repeated through life. It is certainly much easier for a child to acquire a correct pronunciation, than for an adult to reform a bad one.

In using Cummings' Spelling Book it requires but little pains to render the child able to determine the precise sound of every letter, and to make it more natural and easy for him to pronounce the words correctly than incorrectly. A little embarrassment is experienced at first, from the small letters which are used to designate the sounds of the others, but this is readily overcome, and the scholar is then possessed of a system which will enable him to pronounce all the words in his book correctly, and the instructer is saved the labor and frequent interruption which are suffered by the necessity of pronouncing words for the scholar.

In this edition a selection of very interesting reading lessons has been added, making it, it is believed, altogether the best Spelling Book in use.

First Lessons in Geography and Astronomy.

Price 25 cents.

IT is hardly necessary to say any thing in commendation of a work which is so extensively known, and so generally esteemed.

The public are not, however, sufficiently aware of the ease and advantage with which such simple lessons, in these important sciences, may be learned by small children. The time which is nearly wasted in the study of Grammar, if employed in acquiring the elements of more exact sciences, would give the scholar not only a taste for them, but important information. Geography is so simple a science, that children of six or seven years of age may begin to understand it; and when a few of its elements are acquired, something may also be profitably taught them of the worlds around us.

Cummings' First Lessons is known to be far preferable to any other work in use, for introducing these subjects to the minds of children. The proprietors have taken great pains to render the work correct, and deserving of a still more extensive patronage.

Cummings' Testament.

Price $1,00.

THE NEW TESTAMENT of our Lord and Saviour Jesus Christ, with an Introduction giving an account of Jewish and other sects; with Notes illustrating obscure passages, and explaining obsolete words and phrases; for the use of Schools, Academies, and Private Families. By J. A. Cummings, Author of Ancient and Modern Geography. Second Edition. Revised and greatly improved.

Questions on the New Testament.

Price 37½ cents.

CUMMINGS' QUESTIONS on the New Testament, for Sabbath Exercises in Schools and Academies, with four Maps of the countries through which our Saviour and his Apostles travelled.

Colburn's First Lessons in Arithmetic.

Price of Book 37½ cents.
Do. Plates 12½ cents.

THE merits of this little work are so well known, and so highly appreciated in Boston and its vicinity, that any recommendation of it is unnecessary, except to those parents and teachers in the country, to whom it has not been introduced. To such it may be interesting and important to be informed, that the system of which this work gives the elementary principles, is founded on this simple maxim; that, *children should be instructed in every science, just so fast as they can understand it.* In conformity with this principle, the book commences with examples so simple, that they can be perfectly comprehended and performed mentally by children of four or five years of age; having performed these, the scholar will be enabled to answer the more difficult questions which follow. He will find, at every stage of his progress, that what he has already done has perfectly prepared him for what is at present required. This will encourage him to proceed, and will afford him a satisfaction in his study, which can never be enjoyed while performing the merely mechanical operation of cyphering according to artificial rules.

This method entirely supersedes the necessity of any rules, and the book contains none. The scholar learns to reason correctly respecting all combinations of numbers; and if he reasons correctly, he must obtain the desired result. The scholar who can be made to understand how a sum *should* be done, needs neither book nor instructer to dictate how it *must* be done.

This admirable elementary Arithmetic introduces the scholar at once to that simple, practical system, which accords with the natural operations of the human mind. All that is learned in this way is precisely what will be found essential in transacting the ordinary business of life, and it prepares the way, in the best possible manner, for the more abstruse investigations which belong to maturer age. Children of five or six years of age will be able to make considerable progress in the science of numbers, by pursuing this simple method of studying it; and it will uniformly be found that this is one of the most useful and interesting sciences upon which their minds can be occupied. By using this work children may be farther advanced at the age of nine or ten, than they can be at the age of fourteen or fifteen by the

common method. Those who have used it, and are regarded as competent judges, have uniformly decided that more can be learned from it in one year, than can be acquired in two years from any other treatise ever published in America. Those who regard economy in time and money, cannot fail of holding a work in high estimation which will afford these important advantages.

Colburn's First Lessons are accompanied with such instructions as to the proper mode of using them, as will relieve parents and teachers from any embarrassment. The sale of the work has been so extensive that the publishers have been enabled so to reduce its price, that it is, at once, the cheapest and the best Arithmetic in the country.

Colburn's Sequel.

Price $1,00.

THIS work consists of two parts, in the first of which the author has given a great variety of questions, arranged according to the method pursued in the First Lessons; the second part consists of a few questions, with the solution of them, and such copious illustrations of the principles involved in the examples in the first part of the work, that the whole is rendered perfectly intelligible. The two parts are designed to be studied together. The answers to the questions in the first part are given in a Key, which is published separately for the use of instructers. If the scholar find any sum difficult, he must turn to the principles and illustrations, given in the second part, and these will furnish all the assistance that is needed.

The design of this arrangement is to make the scholar understand his subject thoroughly, instead of performing his sums by rule.

The First Lessons contain only examples of numbers so small, that they can be solved without the use of a slate. The Sequel commences with small and simple combinations, and proceeds gradually to the more extensive and varied, and the scholar will rarely have occasion for a principle in arithmetic, which is not fully illustrated in this work.

Colburn's Introduction to Algebra.

Price $1,25.

THOSE who are competent to decide on the merits of this work, consider it equal, at least, to either of the others composed by the same author.

The publishers cannot desire that it should have a higher commendation. The science of Algebra is so much simplified, that children may proceed with ease and advantage to the study of it, as soon as they have finished the preceding treatises on arithmetic. The same method is pursued in this as in the author's other works; every thing is made plain as he proceeds with his subject.

The uses which are performed by this science, give it a high claim to more general attention. Few of the more abstract mathematical investigations can be conducted without it; and a great proportion of those, for which arithmetic is used, would be performed with much greater facility and accuracy by an algebraic process.

The study of Algebra is singularly adapted to discipline the mind, and give it direct and simple modes of reasoning, and it is universally regarded as one of the most pleasing studies in which the mind can be engaged.

Wilkins' Astronomy.

Price 87½ cents.

ELEMENTS OF ASTRONOMY, illustrated with

Plates, for the use of Schools and Academies, with Questions. By John H. Wilkins, A. M. Fourth Edition. Stereotyped.

THE design of this work is to exhibit the leading facts and to illustrate the leading principles of Astronomy in a manner interesting and useful to those scholars who do not intend to pursue the subject to great extent. It may be studied without a knowledge of the higher branches of mathematics; and contains familiar illustrations of the most striking phenomena of nature. The work passed to a second edition in a few months, and is used in the principal schools in Boston and the vicinity; and is coming into very general use.

The numerous testimonies to the excellence of this work and the rapid sale which it has received, have already given it a reputation far above any other work of the kind in this country. Mr. Wilkins' method of illustrating the facts and principles belonging to this science, is uncommonly happy. The scholar is made to appreciate the value of his subject, and to feel that he is aided by an interesting and competent instructer. The difficulties which are continually annoying and discouraging him while studying other treatises on Astronomy, are not even imagined to exist while pursuing the simple and lucid illustrations of Mr. Wilkins. This work is peculiarly adapted for the use of academies and the higher classes in common schools.

When it is considered how well the science of Astronomy is calculated to expand and ennoble the human mind, and how naturally and intimately it is connected with our highest duties and our highest hopes, we cannot doubt that an enlightened public will soon regard it as an essential branch of education in all our schools, and we are confident that this work will be found worthy of being generally adopted.

Worcester's Geography.

Price of Geography, 87½ cents.
Do. Modern Atlas, $1,00
Do. Ancient Atlas, 87½ cents.

ELEMENTS OF GEOGRAPHY, Ancient and Modern, with an Atlas. By J. E. Worcester.

IN this Geography scholars are examined for admission into Harvard and other Colleges. It is also, by order of the school committee, used in all the public Grammar Schools in Boston, and to great extent through the country.

RECOMMENDATIONS.

The Corporation of the University in Cambridge, being of opinion that Mr. Worcester's "ELEMENTS OF GEOGRAPHY" is a work of peculiar merit as an elementary system, have adopted it as the book to be used in the examination of candidates for admission into that seminary.

J. T. KIRKLAND, *President.*

"Mr. Worcester's Geography appears to us a most excellent manual. It is concise, well arranged, free from redundancies and repetitions, and contains exactly what it should, a brief outline of the natural and political characteristics of each country. The tabular views are of great value."

North American Review.

"We consider the work, in its present state, as the best compend of Geography for the use of schools, which has appeared in our country."
Monthly Literary Journal.

"From a careful examination of thy Geography, and a comparison of the work with other productions of like character, I am led to the opinion that it is the most valuable system of elementary geography published in our country." *Roberts Vaux, Esq.*

"I have no hesitation in expressing it as my opinion, that it contains more valuable matter, and better arranged, than any similar work of its size I have ever met with." *Professor Adams.*

"I cannot hesitate to pronounce it, on the whole, the best compend of geography for the use of academies, that I have ever seen."
Rev. Dr. S. Miller of Princeton.

"Of all the elementary treatises on the subject which have been published, I have seen none with which I am on the whole so well pleased, and which I can so cheerfully recommend to the public."
President Tyler of Dartmouth College.

Worcester's Epitome.

Price of Epitome, 50 cents.
Do. of Atlas, 75 cents.

AN EPITOME OF GEOGRAPHY; with an Atlas.

By J. E. Worcester.

THE object in preparing this Epitome has been to furnish a manual adapted to the use of pupils of an early age, preparatory to entering upon the study of the larger *Geography*, published by the same author.

The most striking features and characteristic particulars relating to the different countries, are distinctly brought into view; and with regard to cities, towns, &c. the circumstances to which they are indebted for their importance or notoriety, or the memorable events with which their names are associated, are mentioned.

All the sections or subdivisions are broken into short sentences or paragraphs, which are carefully numbered; and at the bottom of every page are placed questions with corresponding numbers; so that a glance of the eye will direct the pupil to the appropriate answers.

The Epitome and Atlas are made to correspond to each other, and are to be studied throughout in connexion. The natural divisions of the Globe, the prominent features of the different parts, and the situations and boundaries of countries, are, in the first place, to be learned from the Atlas; recourse is then to be had to the Epitome for such information as cannot be given by Maps; and after this, the Maps are again consulted for more minute information respecting the situation of cities, towns, &c. Questions for examination on the Maps are inserted throughout in their proper order.

The population of counties, cities, and chief towns, together with other statistical information, is given in a series of Tables, contained in the Atlas. By this method the book is made considerably smaller in size than it otherwise could have been, and the information is given in a form which will greatly facilitate the acquisition not only of exact knowledge, but also of interesting comparative views of the matters presented.

As some knowledge of Ancient Geography is of essential importance to all who would have even the slightest acquaintance with History, or who would read the Bible with advantage, the Maps of the Roman Empire and Pales-

tine, and a brief outline of Ancient Geography, are added for the use of such students as have not opportunity to study a larger treatise.

Words of difficult pronunciation, have the pronunciation or accent given according to the best authorities.

The book is embellished with forty eight cuts, which exhibit a view of a variety of interesting objects of nature and art, and of the manners and customs of different countries.

MAPS CONTAINED IN THE ATLAS.

Map of the World—do. North America—do. United States—do. South America—do. Europe—do. British Isles—do. Asia—do. Africa—do. Roman Empire—do. Palestine—Comparative Heights of Mountains—Comparative Length of Rivers—Statistical Summary of U. States—do. do. of Europe—do. do. of the Globe.

Elements of History.

Price of Book, $1,00.
Do. Atlas, $1,50.

ELEMENTS OF HISTORY, Ancient and Modern,

with Historical Charts. By J. E. Worcester.

THE Historical Atlas accompanying this volume, comprises a series of *Charts*, formed on a new plan, and will afford means of facilitating the study of *History*, similar to what are afforded by *Maps* in the study of *Geography*. It contains the following Charts:

1. A General Chart of History.
2. A Chart of Ancient Chronology.
3. A Chart of Modern Chronology.
4. A Chart of European Sovereigns since the year 1000.
5. A Chronological, Genealogical, and Historical Chart of England.
6. A Chronological, Genealogical, and Historical Chart of France.
7. A Chart of American History.
8. A Chart of Biography.
9. A Chart of Mythology.

RECOMMENDATIONS.

We have examined the "Elements of History, Ancient and Modern, with Historical Charts," by Mr. J. E. Worcester, and can cheerfully recommend it for general use, as being the best elementary work of the kind with which we are acquainted, and peculiarly calculated to allure the attention of young pupils, and impart a general knowledge of the subjects which it embraces.

The Charts, which are in a great degree novel, afford a facility in imparting and fixing in the memory historical facts, similar to that which is afforded by Maps in the study of Geography.

JOHN T. KIRKLAND,
President of Harvard University.
LEVI HEDGE, } *Professors in the*
SIDNEY WILLARD, } *University.*
FREDERICK BEASLEY,
Provost of Pennsylvania University.

As an apparatus for gaining a general knowledge of History, both expeditiously and effectually, the "Elements," and the accompanying "Atlas," have so much merit, that I cannot but hope they may find their way into all our academies and higher schools, as well as into numerous private families.

and that the result will be a new era in the state of historical knowledge in our country.

JAMES MURDOCK,
Prof. of Ecclesiastical Hist. Theo. Sem. Andover.

I have seen no elementary work which appears to me so well calculated for a text-book as the "Elements." It is well arranged, and is very happy in giving every subject the space that is due to it. For a work so much condensed, it possesses, in a remarkable degree, the interest of a copious narrative.

With the "Atlas" I am still more pleased. I am persuaded that in no other way can the outlines of History, the succession of empires and kings, be so easily and perfectly attained, as by the help of charts.

BENJAMIN HALE,
Principal of Gardiner Lyceum.

I have carefully perused your "Elements of History," and I give it the decided preference to every work of the kind with which I am acquainted. The "Historical Atlas" will prove eminently beneficial to the student of History.

PHILIP LINDSLEY,
President of Cumberland College.

I have examined the "Elements of History," and the accompanying "Atlas," and am of the opinion that they are adapted to supply an important deficiency, which has heretofore existed in the means of instruction. They have been adopted as manuals in the *High School* connected with this Institution, and will form a most useful introduction to the study of History.

WALTER R. JOHNSON, *Principal of the High School of the Franklin Institute, Philadelphia.*

Hedge's Logic.

Price 87½ cts.

ELEMENTS OF LOGIC; or a Summary of the general Principles and different Modes of Reasoning. By Levi Hedge, A. M. Professor of Logic and Metaphysics, in Harvard College. Fourth Edition.

EXTRACTS FROM THE PREFACE TO THE FIRST EDITION.

Most of the treatises of Logic in common use have been formed on the model of the ancient systems, and are encumbered with many scholastic subtilties and unimportant distinctions. The instructions which they furnish on the subject of ratiocination, consist of very little more, than a description of the syllogism, and a few general principles of demonstrative reasoning. They contain no elements nor rules to assist us in reasoning on subjects of probability, or on the ordinary events of human life. The manner in which these books are written is ill adapted to the comprehension of young minds. In explaining the operations of reasoning, many technical terms and arbitrary forms are employed, of which the tendency is rather to embarrass and perplex, than to instruct the learner.

The writer of this compend has pursued the following plan. After passing through the customary distinctions of terms and propositions, he has given a brief account of moral evidence, and pointed out the circumstances, which distinguish it from demonstrative. A concise view is then given of the different forms of reasoning, with the principles on which they respectively proceed.

American First Class Book.

Price $1,00.

THE AMERICAN FIRST CLASS BOOK, or Exercises in Reading and Recitations, selected principally from Modern Authors of Great Britain and America, and designed for the use of the highest Class in public and private Schools. By John Pierpont, Minister of Hollis-street Church, Boston. Author of Airs of Palestine, &c.

A DEMAND for a book of this kind for the use of higher Classes has long been felt both in our public and private Schools, and its almost unexampled sale is some evidence of its adaptation to the end for which it was designed. It has, as will be seen by the certificate which is subjoined, been adopted by the School Committee of Boston, instead of Scott's Lessons, and its circulation is fast extending.

EXTRACT FROM THE PREFACE.

This Book has been compiled with a special reference to the Public Reading and Grammar Schools of this City. It is the result of an attempt to supply the want, which has long been a subject of complaint among those whom the citizens of Boston have charged with the general superintendence of their public schools, as well as with those who are appointed to the immediate instruction of them; of a book of Exercises in Reading and Speaking, better adapted than any English compilation that has yet appeared, to the state of society as it is in this country, and less obnoxious to complaint, on the ground of its national or political character, than it is reasonable to expect that any English compilation would be, among a people whose manners, opinions, literary institutions, and civil government, are so strictly republican as our own.

EXTRACT FROM THE RECORDS OF THE SCHOOL COMMITTEE, BOSTON.

At a meeting of the School Committee, held July 18, 1823, it was ordered, that the American First Class Book be hereafter used in the public reading schools instead of Scott's Lessons.

Attest, WILLIAM WELLS, *Secretary*.

The Friend of Youth.

Price 75 cents.

THE FRIEND OF YOUTH, comprising a great variety of useful and interesting lessons in prose and poetry, adapted to the use of schools. By Noah Worcester, D. D. Second Edition, revised and improved.

THE peculiar excellencies of this work consist in the purity and simplicity of the style and sentiments. In a great proportion of the reading books in our schools, there is too little regard in the selection of lessons to a natural and easy style of expression; and they are not only calculated to corrupt the taste of children, but to give them an artificial and pompous mode of reading. In the Friend of Youth the beauty and simplicity of nature have been carefully regarded, while a pleasing variety has been preserved.

But the principal object of the author seems to have been to render the work totally destitute of such expressions and sentiments as flow from the corrupt passions of men, and engender discord and strife. It is not too much to say, that in this respect, this book is eminently distinguished from most of those now in use. If any Christian will keep in mind, that love to our fellow-

men is our first duty as social beings, and compare the amiable spirit, and the just and benevolent precepts which abound throughout this work, with the selfish and contentious effusions of saman and jarring sentiments, of warring heroes, and of licentious poets, which so frequently disgrace the pages of others, we think he cannot hesitate in deciding which will afford him most aid in training up his children in the way they should go.

Adams' Latin Grammar.

Price $1,00.

ADAMS' LATIN GRAMMAR, with some improvements and the following additions; Rules for the right Pronunciation of the Latin Language; a Metrical Key to the Odes of Horace; a list of Latin Authors, arranged according to the different ages of Roman Literature; Tables showing the Value of the various Coins, Weights, and Measures used among the Romans. By B. A. Gould, Master of the Public Latin School in Boston. This edition is adopted by the University at Cambridge, Mass. and is recommended to the use of those preparing for that Seminary. Second Edition. Stereotyped.

EXTRACT FROM THE PREFACE.

The experience of twenty-six years, and the united approbation of the most judicious instructers in our country, give ample testimony to the excellence of Adams' Latin Grammar. And it is worthy of remark, that amidst the changes of almost every thing connected with education, this work has maintained its popularity throughout the country since the year 1799, when it was recommended by the University of Cambridge. But several typographical errors, which were adopted from that Edinburg edition, from which the first American edition was copied, have been transmitted through subsequent editions to the present time with such scrupulous exactness, that they have now become canonized and are received as authority. Besides these, other errors have been creeping in, till a thorough revision of the work has become necessary. At the time this book was first compiled, the state of education in Scotland may have been such as to render the connexion of the Latin with the English necessary, in the manner they were blended by Dr. Adams; but that necessity does not exist in this country, where English Grammar is separately taught from the more complete systems of Lowth and Murray. For this reason, and because what is not used in a manuel becomes a hindrance, the portion pertaining exclusively to English Grammar has been omitted in this edition; and some few additions and alterations have been made which were deemed important. But in all cases where it was practicable, the words of the original grammar have been preserved.

Jacobs' Latin Reader.

Price 75 cents.

THE LATIN READER, from the fifth German edition, by Frederic Jacobs, Editor of the Greek Anthology, the Greek Reader, &c. &c. Edited by George Bancroft.

THE Latin Reader, which is here published, was compiled by Professor Frederic Jacobs, of Gotha, who having long been engaged in the cares of instruction and the pursuits of a scholar, is in every respect qualified to make judicious selections for the purposes of teaching.

The pupil may be employed upon the easiest lessons in the Reader, as soon

as he has become familiar with the declension of the nouns and the regular conjugations. The exclusive study of grammar retards the learner. He must soon begin to read, and while he is thus exercising all that he has learnt, be made to continue the study of the elements. He will find his progress in reading attended with no increasing difficulty, as the work is so carefully arranged that there exists no rapid transitions.

The editor, in publishing this work in America, has been influenced by a sincere belief, that it forms an easy introduction to the language and character of the Roman world. His duties as a teacher led him to the comparison of many similar works now used in England and on the continent. This seemed to him the best; and having already used it in the school with which he is connected, he has found his opinion confirmed by his experience. The German publication is composed of three parts, of which the first is exclusively the work of Jacobs, and is here offered entire. To give opportunity for exercising the pupil in the declensions and conjugations, a few introductory lessons, which have been taken from different sources, are annexed to the preface.

This work is very fast taking the place of Liber Primus, Historiæ Sacræ, Viri Romæ, &c.

The Latin Reader, Part Second.

Price 75 cents.

THE LATIN READER, Part Second, chiefly from the Fourth German Edition of F. Jacobs and T. W. Doering. Edited by George Bancroft.

THE present continuation of the Latin Reader has for its object, to provide a work suited to the purposes of instruction in the Latin language, of a classic character, interesting to the young mind, and conveying useful information. The first part of this little volume contains select fables from Phædrus; these are followed by extracts taken almost entirely from Cicero and Livy; the volume closes with an abridgment of Justin, for the excellence of which the name of Jacobs is alone a sufficient guarantee. Most of the "Short Narrations" were selected by Doering, who acted in concert with Jacobs. A few more have been added from the twelfth German edition of an elementary work, compiled by Broeder. But it is not by the authority of celebrated names that a school book must be supported. If the present one has any excellence, it consists in this, that by means of judicious and easy selections, the pupil is at once introduced to the fine passages and pure writers of antiquity, without encountering difficulties beyond his strength.

The teacher, in giving instruction, will perceive the necessity of directing his main attention to the language. The rules of grammar in their various application need to be explained; and it is especially important to illustrate each individual word with philosophical method and accuracy with reference to its derivation, its primary signification, and the meanings, which it subsequently acquires.

Cornelius Nepos.

Price 75 cts.

CORNELIUS NEPOS, de vita Excellentium Imperatorum. From the third edition of J. H. Bremi. With English Notes.

Nepos is, more than any other Roman writer, suited to be put into the hands of boys, who have made sufficient progress to be able

to read a Roman author in course. The simplicity and classical character of his style, the separate lives, full of interest and not long enough to weary, the extent of history, of which he gives a pleasing outline, by presenting as in a gallery those illustrious men who directed the fortunes of antiquity, the general purity of the moral tendency of his writings, and the favorable moral influence which always follows from the true history of great men, are circumstances which sufficiently explain why he is so universally adopted in the European Schools, and is beginning to be introduced in so many of our own.

The few notes which accompany this edition are selected and abridged from the commentary of Bremi. In some instances the phraseology of Bradley, an English editor, has been adopted, where his remarks coincided with those of the continental editor. The notes would have been selected much more freely but for the fear of making the volume too large. They almost all of them relate to questions of grammar and language. These are the points, to which the attention of boys is to be directed.

It is an evil, too common among us, to lead boys at an early period to the study of the poets; and to put Virgil into the hands of those, who cannot readily explain an easy prose writer. Now though the style of Virgil is plain, and his narration interesting, still he cannot be properly understood except by one already practised in the language, and well accustomed to mark peculiar uses of words, and it is an act of injustice to the young scholar, to put into his hands poems so full of the highest beauties of art, before he is exercised in all that is requisite in order to interpret them to advantage. It is for this reason among others that it is so well to read Nepos in schools. After him it is not difficult to find writers suited to a continuance of methodical instruction, and Cæsar, Livy, Cicero and Sallust offer a rich variety of prose, much of which should be read, before Virgil can be attempted with real delight and advantage.

Gould's Virgil.

Price $3,50.

PUBLIUS VIRGILIUS MARO. Bucolica, Georgica, et Æneis. Accedunt Clavis Metrica, Noulæ Anglicæ, et Questiones, nec non Index vocabulorum Uberrima. Cura B. A. Gould. In Usum Scholæ Bostoniensis.

THIS Edition of Virgil is printed without the usual *order of construction*, or *interpretation*. The use of these pernicious helps not only prevents the pupil from ever acquiring the power of reading with ease and pleasure without them, but it is utterly subversive of one of the principal objects of studying the language,—that mental discipline which is acquired by the practice of critical and exact analysis.

To aid the Scholar in overcoming the real difficulties in understanding this author, copious English notes are added at the end. In preparing these notes, free use has been made of all the materials within the Editor's reach. In the vast variety of materials presented, it has been found difficult to be sufficiently concise. For it is easy to say much upon Virgil, but difficult to say little to the point.

A list of the verses most difficult to scan is subjoined, with the method of scanning each. A few questions are also added, which may expedite the labor of the Teacher in ascertaining whether the pupil has been thorough in his preparations.

The work is published on a fine paper, and beautiful type; and is, altogether, far superior to any other edition of Virgil in use.

Selections from Ovid.

In press, and will soon be published, SELECTIONS FROM OVID, with English Notes. By B. A. Gould.

Buttmann's Greek Grammar.

Price 62½ cents.

GREEK GRAMMAR, principally abridged from that of Buttmann, for the use of Schools.

PREFACE.

THE superiority of Buttmann's Greek Grammar over any other is acknowledged; but it appears to many instructers, whose judgment deserves the highest respect, that the work presupposes in those who are to make use of it more maturity of mind, than is to be expected of beginners. A desire has, therefore, been repeatedly expressed, that a small Grammar, in accordance with Buttmann, might be prepared for those entering on the study of the Greek language. Such a grammar is now offered to the practical teacher.

This abridgement is designed to contain only the accidence and first principles of the language. All matter that is not of immediate importance and utility has been rejected; and it has uniformly been endeavored to unite simplicity in the arrangement with clearness and conciseness in the expressions. In preparing the work, the best school grammars of the Germans and the English have been carefully consulted on every point, and the judgment of the editor in what is retained and what is omitted has been directed by a comparison of the best manuals. Particular assistance in these respects has been derived from the smaller grammar of Thiersch. The chapter on adjectives, the account of the contract verbs, and the remarks on the Homeric dialect, are entirely, or partly from him. Still there is nothing, which is not either contained or implied in the grammar of Buttmann, from which this professes to be taken.

The practical instructer has here in a small compass all that is essential to be taught in preparing a pupil for any of our colleges. The attention of the youngest can be directed without difficulty to those things, which should sink deeply into the memory. Too much care can hardly be taken to make the learner familiar with the forms of the nouns, and the paradigms of the verbs. These should be as familiar as are the Latin declensions and conjugations. In analizing a sentence the attention must first be directed to the finite verb. That is always a key to the rest, and it will not then be difficult to discover by degrees the subject and object, and their respective qualifications.

Valpy's Greek Grammar.

Price $1,00.

THE ELEMENTS OF GREEK GRAMMAR, with Notes, by R. Valpy, D. D. F. A. S.

"Nequaquam me pœnitet hujus studii, quod per hanc recensionem in *tractatione veterum Grammaticorum* consumsi. Imo tantum eo me adjutum sentio, non modo ad hoc opus, sed ad omnem facultatum linguæ Græcæ, neminem ut arbitrer in *Græcis scriptoribus intelligendis* proficere posse, nisi simili cursu lectionis *præcepta* illorum *collegerit*, et ad optimas rationes *examinaverit*. WOLFIUS, PROLEG. AD HOMER.

FROM THE AUTHOR'S PREFACE.

The great object of the author has been utility. He has endeavored to explain the meaning of terms, and the causes of constructions, and to enliven the rules by analogical allusions to the other languages; a mode of comparison best calculated to illustrate and familiarize the subject. If his explanations are not always satisfactory, they will at least engage the reflecting mind of an attentive student to investigate the origin, to trace the progress, and to extend his knowledge of the purest and most copious of languages.

Jacobs' Greek Reader.

Price $2,25.

THE GREEK READER of Frederic Jacobs, Professor of the Gymnasium at Gotha, and Editor of the Anthology. From the seventh German edition; with an English Lexicon.

At a meeting of the Corporation of Harvard College,

Voted—"That this work be made use of in examining candidates for admission into the University after the year 1826, instead of Græca Minora."

EXTRACT FROM THE PREFACE.

The *Greek Reader*, in the collection of sentences in the first part, arranged according to the rules of the Grammar, is designed to enable the learner to begin immediately to exercise himself, in putting to practice the principles and rules which he has learned in the Grammar. To direct his attention, the word, in which the rule is exemplified in each sentence, is distinguished in the printing.—These sentences, forming the first course, are succeeded by a few fables and a choice of the best anecdotes and apothegms contained in the Greek writers; which will not present undue difficulties to the learner well acquainted with the grammatical exercises that precede them.—The extracts in the department of natural history are from easy authors, and designed, in continuing the progress of the learner in the language, to afford im also amusing and instructive information. *****

A chief object of the editor, in preparing this work, has been to furnish an elementary book to our schools, in which the Greek may be learned through the medium of the English. No learner at school or elsewhere can be as well acquainted with the Latin, as with his mother tongue. The practice of learning Greek through the medium of Latin, has descended to us from a time when the Latin was a common language among scholars, when lectures at the universities were exclusively given in that tongue, and commentaries on authors and lexicons published in no other. For schools, however, there is no one circumstance to recommend the continuance of this practice, not even that of becoming more familiar with the Latin. The Latin of grammars, commentaries, and lexicons is not that, which the learner ought to acquire; and while the Latin language should be studied in the purer sources of the ancient writers, the learner of Greek ought not to be embarrassed by having his attention diverted to any thing else: or his perceptions rendered difficult or indistinct by the foreign medium through which they are made, and with which he must of course be less familiar than with his native language. In Germany and France, editions of Latin and Greek authors for the use of schools, are furnished with notes in the vernacular tongue; and the best lexicons of the Greek, in those countries, are also respectively in French and German. In this country, the opinion of scholars appears to be decided in the same result, and the Greek and English lexicon on the basis of Schrevelius, recently published, is considered a great acquisition by the friends of Greek studies and of an improved system of conducting them in this country. The quantity of matter contained in this work will be per-

ceived to be considerably greater than in the Collectanea Græca Minora. The editor has been led to give it this extent from the opinion that, in the improving condition of our colleges and schools, more Greek might be advantageously studied in the latter.

Collectanea Graeca Minora.

Price $2,25.

AN improved edition of Collectanea Græca Minora, with explanatory Notes collected or written by Andrew Dalzel, A. M. F. R. S. E. Professor of Greek in the University of Edinburg. Sixth Cambridge edition, in which the Notes and Lexicon are translated from the Latin into English.

EXTRACT FROM THE PREFACE.

It has long been a complaint, that the notes of Collectanea Græca Minora, being written in Latin, were not so useful as they might be to beginners, for whose use they were prepared. In this edition therefore the Notes and Lexicon have been translated into English; so that the work may be used without any previous knowledge of the Latin Language. In this edition also a few notes have been added, particularly upon the most difficult part—the Extracts from Tyrtæus.

The text also has been diligently compared with the latest and best editions of the works from which the extracts were made, belonging to the Library of Harvard University, and a few new readings have been introduced which throw light on obscure passages. It is hoped, therefore, that those who have heretofore used and approved the work, will be still better satisfied with it, now that it is more free from errors, and more easy and instructive to young students.

Collectanea Graeca Majora.

2 Vols. Price $7,00.

Ad usum Academicæ Juventutis accommodata; cum Notis philologicis, quas partim collegit partim scripsit ANDREAS DALZEL, A. M, &c. Editio quarta Americana, ex Auctoribus correcta, prioribus emendatior, cum Notis aliquot interjectis. Cantabrigiæ, Mass. E prelo Universitatis. Sumptibus Hilliard, Gray et Soc. Bibliopolarum, Bostoniæ. 2 vols. 8vo.

EXTRACTS FROM A REVIEW OF THIS EDITION.

"THE best criterion by which to estimate the value of works designed to facilitate the purposes of education, is actual experiment. The present selections from Greek literature have been many years before the public, and have constantly been coming more widely into use. Of the first volume there have appeared in England and Scotland at least eight, we believe nine, several editions, and five or six of the second; and in the United States, we have now the fourth edition of the whole work from the press of the University at Cambridge. A book, to meet with such success, must be well adapted to its end."

"Of all the editions which have thus far appeared in Great Britain or America, we do not hesitate to pronounce this to be the most correct. It exhibits the clearest marks of indefatigable diligence and conscientious accuracy on the part of its learned and unassuming editor. Instead of vague and indiscriminating praise, we will endeavor to explain its peculiar advantages.

Our account will be a short one, though the labors which we commemorate extended through years."

"The chief object of the American editor, Professor John S. Popkin of Cambridge, was to make the book a correct one. It had gone through so many editions, and each new one had repeated so many of the errors of the last, and made so many of its own, that both the text and the notes had become very much disfigured. Not only accents and letters were often wanting, but words, and sometimes whole lines were omitted; especially in the notes. In the third American edition, these were in a good degree amended; in the fourth the same purpose has been most assiduously pursued. To do this the original sources of the notes and text were consulted, and these, together with other good editions of the several writers, were diligently compared. Not a few fractures and dislocations were repaired by means of an early edition of the Collectanea. When the sense was found broken and obscure, it appeared on examination that words, lines, and sometimes several lines had been omitted; particularly where a word was repeated at no great distance, the intervening words were sometimes passed over in printing."

"We hope we have said enough to justify our preference of Professor Popkin's edition of the Græca Majora over any other. To give a more distinct idea of what he has accomplished, we venture to affirm, after a close computation which may be relied upon, that of errata in the copy greater and less, he has corrected as many as ten thousand. If after all his care and pains, he has made any or left any, they can be easily marked and corrected, as the present edition has been made on stereotyped plates. It was an undertaking of long and toilsome diligence to correct the press and the copy of a work of this kind, collected from so many sources, and referring to so many authorities.

"Not less that five hundred volumes were of necessity consulted."

Pickering's Lexicon.

Price $5,50.

The GREEK LEXICON of Schrevelius translated into English with many additions.

EXTRACTS FROM THE PREFACE.

IT is a remarkable fact in the history of education, that we should have so long continued the practice of studying the Greek language through the medium of the Latin; and that until very recently we have not had Greek, as well as Latin dictionaries, with explanations in English; and it may justly excite our wonder, that we should, till within about three years past (long since the prospectus of the present work was published) have been destitute of the most important of all books for the acquisition of the language in question—*A Greek and English Lexicon for the use of schools.*

The fact seems the more extraordinary, because in the case of the *modern* languages we always begin our studies with dictionaries explained in our own tongue: nor should we think it practicable, in any other way, to master the niceties and peculiarities of a foreign idiom. Who for example, would sit down to the study of French, or Italian, or German, with dictionaries written in Latin? And yet, what essential difference (except as to pronunciation, which must be learned from the living instructer) can be imagined between the proper methods of studying a modern and an ancient language? For our part, we can entertain no doubt, that one principal reason, we will not say the only one, why Greek is so much less familiar to us than Latin, is the circuitous and awkward practice of studying it through the medium of a third language.

Under a strong conviction, therefore, that it will be rendering an essential service to the interests of sound literature in our country, to promote the study of the language of Greece—which an accomplished scholar characterizes in glowing terms as "the finest ever spoken by mortals," and whose authors will be models of writing, as long as the works of her sculptors and architects shall be models in the fine arts—under this conviction, the Editors offer to their countrymen the present work; of which they will now give a brief account.

The basis of the work is *Schrevelius's* well known Lexicon; which, on the whole, in the present state of Greek studies in this country, was thought preferable to any other manual adapted to *the use of schools*. Schrevelius's work was originally extracted from that of Scapula (an edition of which he superintended), and seems to have been first published in 1654. It was more particularly intended for the Old and New Testaments, Homer, Hesiod, Musæus, Theognis, Pythagoras and other Gnomic Authors, Isocrates, Æsop, &c.; the author also made use of Portus's Ionic and Doric Lexicons and the Lexicon to Pindar and the other Lyric poets. It was published several times on the continent of Europe during the author's life; and within that period was also republished in England by Hill, who enlarged it considerably, more particularly with words from the New Testament, the Septuagint, and the principal poets and orators, as well as the school books of the day. He also added many of the aorists and other tenses, which are so profusely and unnecessarily scattered through the work. Besides the editorial labor bestowed upon it in England, it has received improvements in France, where a valuable edition of it was published in 1779 by the celebrated scholar Vauvilliers; who, as the late editor Lecluse observes, 'mercilessly retrenched all the expositions of the anomalous words and other parts of the work.' These retrenchments have been restored by Lecluse, whose edition of 1819, is the latest French one that happens to have come to our knowledge. Of the other editions, we have before us the Italian one in folio, and a German one, reprinted from the Paris copy, at Vienna in 1822, under the editorial superintendence of Kritsch; who justly observes, that the Lexicon, as now published, is very different from the ancient editions both in copiousness and explanations; and, he adds, that in its present state it may with propriety be recommended to the student in Greek literature. It may now be proper to give a brief account of the labor which has been bestowed upon the present publication.

This work was originally planned many years ago, and was begun by the original Editor in 1814; but the ordinary avocations of a professional life so frequently interrupted its progress, that the editor, for that and other reasons, some years afterwards engaged the assistance of his associate, Dr. Daniel Oliver, Professor of Moral and Intellectual Philosophy at Dartmouth College. A prospectus of it was accordingly issued by them a few years ago, and the work has been in progress to this time.

In the execution of their task the Editors have not contented themselves with being translators of Schrevelius's Latin interpretations, which are often ambiguous and unsatisfactory; but they have, to the best of their ability, rendered the English explanations from the original Greek. It will be at once perceived, that the significations given are more copious than the Latin ones of Schrevelius. This has been occasioned partly by the difficulty of always finding single English words, which would correspond to the Greek so exactly as many of the Latin terms do; but principally from a desire to obviate the embarrassment arising from the ambiguity of the general terms used in the Latin, by substituting for them English significations less general and of course more precise. It has been the intention of the Editors, that the work should comprehend all the words which are to be found in Professor Dalzel's Collectanea Majora and Minora, Jacob's Greek Reader, and the other books now studied in our schools and other seminaries of learning.

Among the improvements, as the Editors hope they may be called, in the present work, they would state—that upwards of two thousand articles in it

are either wholly new, or have new additions, of more or less importance; these articles are distinguished by a bracket placed at the end of them. Besides the additions thus marked, very numerous references to authors have been inserted without being thus designated. The *prepositions* have been a particular subject of attention; and the uses of the *article* are explained with as much minuteness as would be advantageous to that class of students for which the work is chiefly designed. Another improvement, and one which was not adopted in any edition of Schrevelius till a long time after the present work was begun, is the marking of the *quantities* of the doubtful vowels. This has been done for the most part without sacrificing the *accents*; and in those instances, where the accent does not appear, the student will know that it has been displaced in order to make room for the *quantity*; and he will without much difficulty decide by the place of the syllable, what kind of accent should be supplied. The Editors may here observe, that their work is printed with the accents; for they cannot but consider them to be as much a part of the language as the breathings, or the alphabetic characters themselves are, whatever opinions may be entertained by some scholars as to the particular use of them. But, besides being a constituent part of the language, they are of real utility in the study of it.

The Editors will now make a few remarks respecting the manner in which they have endeavoured to execute their task. In the progress of the work almost all the Lexicons extant have been occasionally consulted; those which have been most frequently resorted to are Hedericus, Planche's excellent *Dictionnaire Grec-Francois*, and Schneider's admirable *Griechisch-Deutsches Worterbuch*; and, for Scriptural words, the highly valuable edition of Wahl's *Lexicon to the New Testament*, by Mr. Robinson, of the Theological Institution at Andover. The learned Lexicon of Dr. Jones was not received, until so much progress had been made in the present work as to prevent much use of it; and, just before the last sheets were printed off, a copy of the London translation of Schrevelius reached this country; which, till the Editors had looked into it, made them regret that they had not sooner met with it. A slight examination, however, made it apparent, that although it contained many additional words, yet it was a hurried performance, upon which it would not have been safe to rely.

Of the authors in the *Collectanea Majora*, those which have been a particular subject of attention on the part of the Editors are, Herodotus, Thucydides, Longinus, and Aristotle; the last of whom, from the abstruse nature of his discussions and his condensed manner of writing, presents very great difficulties to the young student. But, to adopt a remark of the poet Gray, "he has abundance of fine uncommon things, which makes him well worth the pains he gives one;" it was, therefore, thought useful, that a portion of the editorial labour should be allotted particularly to his language; in the hope, that those young men, who are ambitious of thinking profoundly, reasoning closely, and judging correctly, may be incited to study the works of one of the greatest masters of thinking and reasoning that the world has ever seen.

Greek Testament.

Price $2,25.

THE FOUR GOSPELS OF THE NEW TESTAMENT, *in Greek*, from the text of Griesbach, with a Lexicon in English, of all the words contained in them designed for the use of schools.

ADVERTISEMENT.

THIS edition of the Four Gospels has been prepared in consequence of the new arrangement of the studies in Greek, preparatory

to admission in the University at Cambridge. The Corporation have substituted Jacobs' Greek Reader and the Four Gospels for the Collectanea Græca Minora, and the whole of the New Testament. It has been deemed expedient to publish a separate edition of the Gospels. The text used is that of Griesbach, with the omission of the marginal readings, as not being appropriate to a School Book. A lexicon of all the words in the Four Gospels, prepared with great care by a gentleman highly qualified for the task, is subjoined. It is hoped that the execution of the work will be found such as to merit the approbation of instructers and render it useful to learners.

Cambridge Mathematics.

LACROIX'S ARITHMETIC, translated, with such alterations and additions as are found necessary, in order to adapt it to the use of the American student. Price $1,00.

EULER'S ALGEBRA, select parts, comprehending Simple and Quadratic Equations, together with a copious collection of Questions. Price $1,50.

[These two parts constitute the preparatory studies requisite for admission to the University.]

LACROIX'S ALGEBRA, translated, with a few alterations and additions. Price $1,50.

LEGENDRE'S GEOMETRY, translated, with an Introduction containing the doctrine of Proportions. Price $2,00.

ANALYTIC GEOMETRY, or a Treatise on Plane and Spherical Trigonometry, and on the application of Algebra to Geometry, comprehending Conic Sections; compiled from the Mathematics of Lacroix and Bezout, and translated, with alterations and additions. Price $1,50.

TOPOGRAPHY, or an Elementary Treatise on the application of Trigonometry to Orthographic and Stereographic Projection, Dialling, Mensuration of Heights and Distances, Navigation, Nautical Astronomy, Surveying and Levelling, together with Logarithmic, and other Tables. Price $2,00.

MECHANICKS, an Elementary Treatise, comprehending the Doctrine of Equilibrium and Motion, as applied to Solids and Fluids. Price $4,00.

ELECTRICITY, MAGNETISM, AND ELECTRO-MAGNETISM, embracing the late discoveries and improvements, digested into the form of a Treatise. Price $3,50.

OPTICS, an Elementary Treatise, comprehending the leading principles of the Science. Price $3,00.

CALCULUS.—An introduction to the Differential and Integral Calculus, or the doctrine of Fluxions, designed for an extraordinary class in the University. Price $1,50.

ASTRONOMY, being the last volume of the Cambridge course of Natural Philosophy. By Prof. Farrar, of the University of Cambridge, New England.

The several parts of the above course of Mathematics are sold separately.

French Language.

Price $1,00.

New Elements of Conversation, in English and French.

A work composed upon the plan of that of Dr. Wanostrocht, by Professor G. Poppleton at Paris; followed by the Manual of Idiotisms of Madame de Genlis. Second American edition, revised, improved, and corrected by an Instructer in Languages.

NOTICE FROM THE WORK.

"THE publishers present with satisfaction a second edition of this useful collection of French and English Dialogues and Idiotisms, because they feel assured that it will prove more worthy of the approbation of a discriminating public than was the case with the first, the publication of which having been necessarily hurried, did not allow time duly to observe and rectify many errors of the original European copy.

"The English part of the Manual of French Idiotisms of Madame de Genlis particularly required and has undergone a thorough reform, and has been made to comport, as far as possible, with the easy, chaste, and polished style of that celebrated lady.

"This edition will be found enlarged with the classical vocabulary of Professor Poppleton, which addition may be considered as advantageous, especially to the younger part of students whose principal faculty is memory; and what should recommend this publication to all descriptions of learners, besides the utility of the contents, is the entire absence of offensive and obsolete words and phraseology, too frequently met with in books of this kind.

"It may also be confidently asserted, that this work will be found as free from typographical errors, as any ever printed in America in a foreign language; consequently it is presumed, that it will meet with a good reception in all schools and seminaries where the French language is cultivated.

French Phrase Book.

Price 37½ cents.

The FRENCH PHRASE BOOK, or Key to French

Conversation. Containing the chief idioms of the French Language. By M. L'Abbe Bossut.

Extract from the Advertisement to the London Edition.

THE Editor feels no hesitation in asserting, that after Students have perfected themselves in the contents, even of this small Tract, they will have no difficulty in reading any French book, as far as depends on the peculiar idiom or construction of the language.

By learning these familiar and Idiomatic Phrases, the young English scholar will acquire the French language and idiom exactly in the same manner as it is acquired by a Native—by Practice, and Example, and not by Rule. Rules are not to be despised; but they are rather adapted to perfect than to initiate.

If the compiler were asked, what should be the first thing to be learnt when a person begins to study any foreign tongue? He would reply, WORDS—If what next? He would still reply, WORDS—And, if what next? He would still answer, WORDS *as they are used relatively to other words;* that is, in the simple Idiomatic Phrases of the language, such as those which compose the present Work.

Worcester's Primer.

Price 12½ cents.

A PRIMER of the English Language, for the use of Families and Schools. By Samuel Worcester.

THE design of this work is to furnish Children with a First Book—to teach them the Alphabet, and the elements of Spelling and Reading. It is executed on fine paper—the letters are large and distinct—and the cuts, which are numerous, are finely engraved.

The principles on which this work is executed are new, and important in developing the mind of the pupil.

Rational Guide.

Price 25 cts.

The Rational Guide to Reading and Orthography, being an attempt to improve the arrangement of words in English Spelling Books, and to adapt the reading lessons to the comprehension of those for whom they are intended. By William B. Fowle, Instructer of the Monitorial School, Boston.

"Not as though I had already attained or were already perfect."

PREFACE.

IN presenting this stereotype edition of the Rational Guide to the public, the author would acknowledge the assistance of several critical friends who have kindly pointed out many errors in classification and orthography which escaped his notice in the former edition. A continuance of such favors will enable the author to make the book as perfect as any thing of the kind can be; for, by the process of stereotyping, all that is right is fixed, and all that is wrong may be permanently corrected.

Some easier reading lessons have been added, at the request of the Committee of Primary Schools. In dividing the words into syllables, the author endeavoured to make such a division as would lead *children* (who usually study the spelling lessons before they have heard the words pronounced,) to a right pronunciation. Hints at improvement in this part of the book will be candidly considered.

W. B. F.

The American Speaker, or Exercises in Rhetorick,

Price $1,25.

Being a new and copious selection of Speeches, Dialogues, and Poetry, from the best American and English sources, adapted to the use of Schools and Academies. "*Ex his cœterisque lectione dignis auctoribus, et verborum sumenda copia est, et varietas figurarum, et componendi ratio, tum ad exemplum virtutum omnium mens dirigenda: neque enim dubitare potest quin artis pars magna contineatur imitatione.*"

"THE obvious want of interesting and *modern* extracts for the use of schools in which Rhetorick is taught, has produced the present compilation. Although several old and approved pieces are retained, it may be said with truth that this is a *new* selection, embodying the best of what has heretofore been published and much which has never before

appeared in any school book. The friends of eloquence will be gratified to possess so many brilliant extracts in so small a compass, and the American patriot will be glad of an opportunity to compare the eloquence of his countrymen with that of the mother country."

Linear Drawing.

Price 62½ cents.

An Introduction to Linear Drawing, translated from the French of M. Francœur, and adapted to the use of Public Schools in the United States. By William B. Fowle, Instructer of the Monitorial School, Boston.

FROM THE TRANSLATOR'S PREFACE.

AN elementary treatise on Drawing, adapted to the use of common schools, cannot but be well received. Besides the professions which make the art of drawing their particular study, anatomists, naturalists, mechanics, travellers, and indeed all persons of taste and genius, have need of it, to enable them to express their ideas with precision, and make them intelligible to others.

Notwithstanding the great utility of this branch of education, it is a lamentable fact, that it is seldom or never taught in the public schools, although a very large proportion of our children have no other education than these schools afford. Even in the private schools where drawing is taught, it is too generally the case that no regard is paid to the geometrical principles on which the art depends. The translator appeals to experience when he asserts, that not one in fifty of those who have gone through a course of instruction in drawing, can do more than copy such drawings as are placed before them. Being ignorant of the certain rules of the art, (and they are the most certain because mathematical,) they are always in leading strings, and unless endowed with uncommon genius, never originate any design, and rarely attempt to draw from nature. It is to remedy this defective mode of teaching, that the translator has been induced to present this little work, on the elements of drawing, to the American public.

English Composition.

Price $1,25.

The Elements of English Composition; serving as a sequel to the study of Grammar. By David Irving, LL. D. Author of the Lives of the Scottish Poets. Second American from the Sixth London Edition.

EXTRACTS FROM THE PREFACE.

"THOUGH it was my principal object to treat of prose composition, yet a few observations on poetry incidentally occur. The remarks which have been suggested with regard to the nature of figurative language, apply equally to prose and to poetry; but the poets have furnished me with the most copious and beautiful illustrations.

"The rules of criticism are more successfully inculcated by particular examples than by general precepts. I have therefore, endeavored to collect abundance of apposite quotations, in order to illustrate every branch of the subject.

"It may, perhaps, be alledged that in my critical strictures I have often betrayed too much severity of censure, and that in general I have been too

solicitous to expose the faults of eminent writers. But let it be remembered, that in a work of this kind it was necessary to expose defects, as well as to extol beauties.—Those errors which have received the sanction of great names are always dangerous; as they frequently become the object of absurd imitation.

"In exhibiting examples of the faults, as well as of the beauties, of composition, I have invariably had recourse to such works as seemed in some respect entitled to praise. If I have not treated living authors with all the delicacy and tenderness recommended by St. Real, I have at least refrained from every wanton attack."

Gardner's Globes.

Price $26,00 Per Pair.

A PAIR OF NEW AND ORIGINAL GLOBES,

constructed differently from any other work of the kind now before the public, and from the best authorities, to the present time. By J. W. Gardner.

THE Sciences of Geography and Astronomy are becoming so popular in our schools, that whatever will facilitate the study of them, must be regarded as a great benefit to the public. Maps give so imperfect an idea of the form of the earth, and the bearing of its several parts, that their value is comparatively small without the aid of Globes. Charts of the stars are uncommon, and expensive; and they are greatly inferior to Globes in illustrating the position and motions of the heavenly bodies.

The object in studying any science, is to acquire the greatest amount of information in the least time. In studying, time is not only money, it is more,—it is knowledge,—it is expansion and elevation of the mind,—it is the ability of being useful. The study of Geography and Astronomy is so much facilitated by the use of Globes, that several months of the scholar's time are actually saved; and were we to consider only the saving in the expense of tuition, parents would find it good economy to purchase Globes for their children. Besides, it is scarcely possible to give, without Globes, the illustrations for which they are designed.

The price of Globes is now so much reduced, as to come within the means of a great portion of society. All our common schools may be provided with them. Where a single family is unable to meet the expense, several families in the same neighbourhood may combine in the purchase; and their children will still be so well accommodated, as to render the possession highly valuable.

The Publishers believe that they are fully justified in asserting, that no other Globes constructed in this, or in any other country, will bear a comparison, as to accuracy and elegance, with those which they now offer to the public; and these are much cheaper than any others which have been constructed.

RECOMMENDATIONS.

Mr. J. W. GARDNER appears to have made himself acquainted with the best methods of constructing artificial globes, and to have used all due care in the construction of his work. The stars are laid down singly, and the number and outline of the constellations are given, according to the latest and most approved catalogues and charts of the heavens. The terrestrial globe is understood to have been constructed in a similar manner, by means of the best tables of the latitude and longitude of places.

These globes are accordingly recommended as well adapted to the purposes of elementary instruction in geography and astronomy.

JOHN FARRAR,
Prof. of Math. and Phil. in Harvard University.

I have examined, with a great deal of care, Mr. Gardner's Terrestrial Globe, and find it very accurately executed according to the latest discoveries and the best tables. The coasts are carefully laid down, with an extraordinary degree of minuteness, from the best established authorities. The outlines are consequently very exact. All important places in the interior of continents, where the latitude and longitude have been well ascertained, are also laid down with the same care. GEO. B. EMERSON.

I have examined Mr. J. W. Gardner's Celestial Globe, and find it very correct. The constellations are given from the best authorities, and the places of the stars from the latest and most approved catalogues. I have examined several hundred stars upon this globe with respect to their right ascension and declination, and find that their places are given with great care and fidelity. JAS. HAYWARD.

Harvard University, Cambridge.

SIR,

After the opinion expressed by Professor Farrar of your ability and fidelity in the construction of your Globes; and after the testimonial of Mr. George B. Emerson, who has examined your Terrestrial, and of Mr. James Hayward, who has paid particular attention to your Celestial Globe, (one of these gentlemen having been lately and the other being now in the department of Mathematics, Natural Philosophy, and Astronomy in this University, and both well known for their accurate acquaintance with these branches of science,) I can have no doubt that these productions of your skill and labour are fully entitled to peculiar favor and patronage.

I am, Sir, with esteem, your obedient servant,

MR. J. W. GARDNER. J. T. KIRKLAND, *President.*

Gardner's New 4 inch Globes.

IN consequence of the increased demand for Gardner's 12 inch Globes, the author has been induced to publish a pair of 4 inch Celestial and Terrestrial, corresponding in every respect with the 12 inch, except the omission of the names; which present an entirely new and interesting exercise in Geography and Astronomy. Price $2, each.

Boston Bookstore.

HILLIARD, GRAY, AND CO. Publishers, Booksellers, and Stationers, No. 134, Washington street, Boston, keep constantly for sale a great variety of English, French, Italian, Spanish and German Books, in the various branches of Learning. *Also*, a supply of the finest Stationary.

H. G. & Co. have recently established such a correspondence in Europe, as will ensure the prompt execution of all orders to England, France, or Germany, entrusted to them.—English Paper, Quills, Lead Pencils, Ink Powders, &c. of the first quality, furnished wholesale or retail.

HILLIARD, GRAY, AND CO. make LIBERAL DISCOUNTS to School Committees, and those who purchase to sell again.

T. R. MARVIN, PRINTER, Congress-street, Boston.

Louisa Rogers
Salem.